

CHAPTER 4.0 ENVIRONMENTAL CONSEQUENCES

This chapter analyzes the probable beneficial and adverse social, economic, and environmental effects that would be expected to occur as a result of implementing each alternative carried forward in Chapter 2.0. The best available information was used to determine the potential effects of the alternatives. Potential effects are reported for each resource described in Chapter 3.0.

This chapter describes the effects by resource and compares the effects among all alternatives, including the No-Action Alternative. For some resources, the discussion of effects is grouped under the heading Action Alternatives. The Action Alternatives include Alternatives A1, A2, A3, and A7 (the Applied-for Project). For other resources, the discussion of effects is by alternative or alternative segment.

The discussion of effects for each resource includes both direct and indirect effects. Direct impacts were typically calculated using each alternative's permanent impact area. The permanent area of impact for each alternative is the area of the project that would be changed during construction and not restored to its original state. This includes areas of fills, cuts, channel re-alignments, or other permanent changes to the landscape. Indirect impacts were identified by considering how a resource may be affected by the project in the future and/or outside of the permanent area of impact. As discussed in Appendix C (Section C.1, Land Use), the project would not create related actions pertaining to land development (induced growth), increased traffic, or altered traffic patterns in the Study Area. Therefore, no indirect effects would occur to any resource as it pertains to these related actions. Indirect effects analyses focus on resource-specific indirect effects, if any.

In addition, effects for each resource are described as either short term or long term. Measures proposed to avoid, minimize, and mitigate adverse effects, as applicable, are described in Chapter 5.0.

Also included in the discussion of effects is a determination of significance. The significance of effects as defined by NEPA requires consideration of both context and intensity (40 CFR 1508.27). Context considers the locale of the impact and the region. Intensity considers the severity of the impact, including beneficial as well as adverse impacts; effects on public health or safety; unique characteristics of the Study Area (as defined in Chapter 3.0 for each resource; whether the effects are highly controversial; whether there are highly uncertain effects or unique or unknown risks; whether the action establishes a precedent; whether the action is related to other actions with individually insignificant but cumulatively significant effects; whether historic, cultural, or scientific resources are affected; whether threatened or endangered species are involved; and whether the action threatens to violate federal, state, or local requirements protecting the environment. Each resource section classifies the magnitude of the effects using the terms negligible, minor, moderate, or major.

What are direct effects?

Direct effects are those that would occur as a direct result from implementing one of the alternatives and occur at the time of the project and within the footprint of the alternatives. Most direct effects would occur from the construction of the alternative.

What are indirect effects?

Indirect effects are those that also result from the project but occur later in time and would occur outside of the footprint of the alternatives (40 CFR 1508.8).

What are short-term effects?

For the purposes of this analysis, short-term impacts are estimated to persist for five years following disturbance and would result primarily from temporary construction disturbances that would either be reclaimed (for example, the two-lane temporary roadway) or would cease (for example, construction noise).

What are long-term effects?

Long-term impacts are expected to be permanent (for example, roadbed and bridges) or would occur over the life of the project.

The Corps is utilizing various sections of this EIS for a Section 404(b)(1) analysis. Sections pertaining to the Section 404(b)(1) analysis end with a bracketed reference to the Section 404(b)(1) regulations that pertain to that resource discussion. The Section 404(b)(1) analysis determines the LEDPA. Alternatives were screened according to NEPA guidelines as well as Section 404(b)(1) guidelines. See Appendix K, Section 404(b)(1) Analysis, for more detail.

Permits and approvals that would be required to implement NDOR's Applied-for Project are presented in Section 4.12, Permits. Resource impacts caused during construction are addressed in Section 4.13, Temporary Construction Impacts. Short-term uses of the environment versus long-term productivity are presented in Section 4.14, irreversible and irretrievable commitment of resources is discussed in Section 4.15, and cumulative impacts are presented in Section 4.16. A comprehensive summary of effects for all alternatives by resource and by alternative segment (west and east) is provided in Section 4.17, Summary of Environmental Consequences. Figures (Figures 1a through 8b) found at the end of this chapter provide locations of each Action Alternative's permanent area of impact relative to the natural environment and the human environment resources discussed in this chapter.

What is a cumulative impact?

A cumulative impact is defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions" (40 CFR 1508.7)

4.1 WILD AND SCENIC RIVERS

Only NDOR's Applied-for Project, Alternative A7, is analyzed for impacts under the Wild and Scenic Rivers Act. The authority for evaluation under the Wild and Scenic Rivers Act (16 USC 1271-1287, Public Law 90-542) is found in Section 7(a) of the Wild and Scenic Rivers Act. Through the language of Section 7(a) of the Wild and Scenic Rivers Act, Congress expressed the clear intent to protect river values from the harmful effects of water resources projects. The Wild and Scenic Rivers Act prohibits federal agencies from assisting in the construction of any water resources project that would have a direct and adverse effect on a designated river or Congressionally authorized study river. Section 7(a) of the Wild and Scenic Rivers Act states:

...no department or agency of the United States shall assist by loan, grant, license, or otherwise in the construction of any water resources project that would have a direct and adverse effect on the values for which such river was established, as determined by the Secretary charged with its administration.

The evaluation procedure under the direct and adverse effects standard for a federally assisted project inside a designated river was performed using guidance from the Interagency Wild and Scenic Rivers Coordinating Council (2004) and is presented in Appendix A.

The MNRR contains the following ORVs: cultural, ecological, fish and wildlife, geological, recreational, and scenic. Alternative A7 was assessed for its impact on the free-flowing condition and the water quality of the MNRR, as they are integral to its designation status. In general, there would be short-term effects on water quality, fish and wildlife habitat, recreation and scenic qualities due to the presence of the construction equipment and its associated noise, and the potential for increased sedimentation during construction. Long-term, the free-flowing condition would be improved because there would be more and larger culverts (see Appendix B) and the existing roadway would be removed from the floodplain. Long-term, water quality would be improved due to reduced overtopping. Alternative A7 would avoid all known historic and cultural resources. There would be no effect on ecological values and a negligible effect on fish and wildlife habitat. Because the road

requires fill and limited cuts, there would be a negligible effect on geological values. A reliable roadway would have a beneficial effect for recreation values. Finally, Alternative A7 would have a negligible to moderate impact on the scenic values. Please see the following sections for various resource categories and Appendix A for further detail.

4.2 FISH AND WILDLIFE

The Study Area was superimposed on aerial photographs and overlaid with 2011 National Land Cover Database coverage (USGS 2014) to categorize habitat types using ArcGIS software. NDOR's wetland delineation data were used to identify wetlands and other waters of the U.S. (see Appendix G). A visual windshield survey was conducted on September 28 and 29, 2008, to verify the documented habitats (see Figures 4-1a and 4-1b).

Potential effects on fish and wildlife and their habitat include the direct effects calculated within each alternative's permanent area of impact of construction as well as indirect effects, such as those that might occur due to noise or visual disturbance. Temporary impacts due to construction are discussed in Section 4.13.

4.2.1 Fish and Aquatic Resources

Impacts on fish and aquatic resources would occur mainly within the wetland nursery habitat located in the floodplain with a direct hydrologic connection to the Missouri River and other tributaries. Fish and aquatic resources were evaluated based on aerial photographs and wetland habitat mapping conducted by the Corps (2011e). Based on this wetland mapping, there are approximately 4,764 acres of wetland habitat directly connected to the Missouri River from Bazile Creek to Santee, Nebraska (Corps 2011e). Additionally, based on the University of Nebraska at Lincoln 2005 Land Use Coverage, there are approximately 1,414 acres of wetlands within the Study Area from Ponca Creek downstream to Bazile Creek, which yields a conservative total of approximately 6,100 acres of wetlands between Ponca Creek and Santee in and immediately adjacent to the Study Area.

Effects on fish and aquatic resources are based on the overall quantity of wetland habitat impacted as compared to the total amount of wetland habitat located within the Study Area. The acres of wetland habitat that would be permanently impacted within each of the Action Alternatives were calculated using ArcMap computer software and are based on the NDOR wetland delineations. The total area of each habitat type is depicted in Figures 4-1a and 4-1b. These calculations were based on the permanent area of impact of each Action Alternative. Impacts were classified as negligible, minor, moderate, or major based on the following criteria:

- Negligible – less than 5 percent (less than 305 acres) of wetlands would be permanently affected within the Study Area
- Minor – between 5 and 15 percent (between 305 and 915 acres) of wetlands would be permanently affected within the Study Area
- Moderate – between 15 and 25 percent (between 915 and 1,525 acres) of wetlands would be permanently affected within the Study Area
- Major – more than 25 percent (more than 1,525 acres) of wetlands would be permanently affected within the Study Area

These criteria were established using best professional judgment. It is assumed that habitat loss of 25 percent or more would have a major impact on aquatic species because a loss of that size would limit the species ability to find new suitable habitat and recover from the permanent loss of habitat.

No-Action Alternative

The No-Action Alternative would result in negligible effects on fish and aquatic species resulting from the existence of N-12 or from routine maintenance actions.

Action Alternatives

Each Action Alternative would include construction of bridges over Ponca Creek, Harry Miller Creek, and Bazile Creek, as well as a number of other culverts and structures at several drainageways (Appendix B has a detailed list of the culvert sizes and bridge

lengths that are proposed for each alternative). Alternatives A1 and A2 would have four bridges in the west segment, with spans ranging in length from 90 feet to 280 feet, and one bridge in the east segment with spans of 920 feet and 1,020 feet for each alternative, respectively. For Alternatives A1 and A2, the bridges at the aforementioned creeks would be on the current alignment across the floodplain of each creek.

Alternatives A3 and A7 would require construction of new bridges and culverts off of the current alignment. For all Action Alternatives, bridge piers would be placed outside of the confines of the channel and would not require channel realignment. Therefore new bridge locations would not impact these waterways. Alternative A3 would have five bridges along the west segment with spans ranging from 150 feet to 300 feet, and one bridge along the east segment with a span of 1,020 feet.

Alternative A7 would have eight bridges along the west segment with spans ranging in length from 150 feet to 950 feet. The east segment of A7 would have six bridges with spans ranging in length from 525 feet to 1,400 feet. Alternative A7 would involve constructing 1.8 miles of bridges over several sections of the roadway along the base of the bluffs. These alternatives would require that additional piers be placed in wetland areas, but would increase floodplain connectivity under the roadway.

Most of the culverts proposed for the Action Alternatives are single, twin, triple, and quad concrete box culverts that range in width from 5 feet to 14 feet (see Appendix B). These structures would remain on the current alignment for Alternative A1. However, due to the raising of the existing alignment under Alternative A1, new culverts would need to be lengthened and sized for hydraulic capacity. Some channel realignment and consequential fill of wetlands would be needed at various locations as the new roadway embankment would affect the current flow patterns. Alternatives A2 and A3 would require widened and raised structures to be constructed off alignment, requiring some channel realignment and consequential fill of wetlands. The improved bridges and additional culverts would allow for greater opportunity for fish passage and habitat connectivity as compared to current conditions.

Each Action Alternative would impact between 91 and 147 acres of floodplain wetland fish habitat, although these impacts would be considered negligible based on the amount of impacts compared to the total amount of wetlands located within the Study Area (that is, these impacts are less than 5 percent of what is available). Due to the type and nature of the fish located in the Missouri River floodplain wetlands, which include mostly very small and mobile species, such as minnows and macroinvertebrates, all of the Action Alternatives' impacts on fish and other aquatic species in this habitat would be negligible. See Table 4-1 for impacts on wetland habitat.

What is not a routine maintenance action?

Routine maintenance actions are not maintenance activities that impact jurisdictional wetlands or other waters of the U.S. would require a federal action from the Corps.

Actions within the 39-Mile District of the MNRR that impact jurisdictional wetlands or other waters of the U.S. would require a federal action from the Corps and/or the NPS.

These federal actions would also require compliance with NEPA and would be evaluated on each independent action. Future maintenance activities associated with the No-Action Alternative requiring a federal action are not evaluated in this Draft EIS.

According to the analysis of effects of the Action Alternatives on water quality (see Section 4.4), all alternatives would have a negligible effect on water quality and would therefore have a negligible effect on aquatic habitat as it relates to water quality (40 CFR 230.31)

Fragmentation of wetlands or a change in wetland hydrology could lead to indirect effects of the Action Alternatives on fish and aquatic resources. While there would be some localized fragmentation of wetlands under Alternatives A1 and A2, impacts would occur in areas where fragmentation already exists. For Alternatives A3 and A7, while new areas of localized fragmentation may occur, the subsequent removal of the exiting roadway would decrease existing fragmentation. Fragmentation under Alternative A7 is minimized further due to the increased number and length of bridges incorporated into the design.

Habitat fragmentation may occur when portions of a natural channel are placed within a culvert (Appendix B provides details of the number and lengths of culverts). Culvert lengths are increasing under each Action Alternative compared to the existing condition. Culverts are already in place in Alternative A1 and A2. Under Alternative A3 and A7, while new areas of natural channel would be placed in a culvert, the removal of existing culverts associated with the removal of the existing roadway would also occur.

At a larger floodplain scale, the wetlands may have increased function under all Action Alternatives due to increased connection from more and larger culverts, or in the case of Alternatives A3 and A7, removal of the existing roadway. None of the Action Alternatives would alter wetland hydrology within the floodplain (see Section 4.6). The mortality impacts from road runoff (for example, deicing sand and salt mixes) are anticipated to be similar to existing conditions.

4.2.2 Wildlife

Wildlife resources were evaluated based on aerial photographs and habitat mapping. Field verification of the land use habitat types was conducted from nearby public roads in September 2008. Habitat for fish, mammals, birds, reptiles, and amphibians was evaluated based on each species' general associations with the specific habitat types. The number of acres of grassland/rangeland, agriculture, and woodland habitat that would be affected by each Action Alternative was determined by overlaying aerial imagery with habitat classifications and then each Action Alternative's ROW limits. Permanent effects on wetland habitat would occur in areas that are permanently filled by the roadway footprint. While not all land types may be converted within ROW (for example woodlands could remain woodlands in the ROW), this analysis conservatively estimates all area within the ROW as a permanent impact.

Effects on wildlife are based on overall quantity of vegetated habitat type. The area of each habitat type that would be permanently impacted within each of the alternatives was calculated using ArcMap computer software. The total area of each habitat type is depicted in Figure 2 of Appendix D. Within the Study Area, there is a total of 1,687 acres of grassland/rangeland, 1,414 acres of wetlands, 897 acres of woodlands, and 134 acres of agricultural land. The impact calculations are based on the permanent area of impact of each alternative. Impacts are classified as negligible, minor, moderate, or major based on the following criteria:

- Negligible – less than 10 percent of any particular habitat type (less than 169 acres of grassland/rangeland, 141 acres of wetlands, 90 acres of woodland, or 13 acres of agricultural land) would be permanently affected within the Study Area
- Minor – between 10 and 33 percent of any one particular habitat type (between 169 and 557 acres of grassland/rangeland, between 141 and 467 acres of wetlands, between 90 and

- 296 acres of woodland, or between 13 and 44 acres of agricultural land) would be permanently affected within the Study Area
- Moderate – between 33 and 66 percent of any one particular habitat type (between 557 and 1,113 acres of grassland/rangeland, between 467 and 933 acres of wetlands, between 296 and 592 acres of woodland, or between 44 and 88 acres of agricultural land) would be permanently affected within the Study Area
 - Major – more than 66 percent of any one particular habitat type (more than 1,113 acres of grassland/rangeland, more than 933 acres of wetlands, more than 592 acres of woodland, or more than 88 acres of agricultural land) would be permanently affected within the Study Area

Using best professional judgment, habitat loss of 66 percent or more would have a major impact on the wildlife species in the Study Area because although most species are generalists, removing more than two-thirds of their habitat would likely be detrimental to individuals and populations of multiple species due to a large change in habitat availability.

No-Action Alternative

The No-Action Alternative would result in negligible effects on fish and wildlife resulting from the existence of N-12 or from routine maintenance actions. Vehicle and wildlife collisions would likely continue due to a lack of connectivity under the roadway.

Action Alternatives

Each of the Action Alternatives would have negligible impacts on woodland, grassland/rangeland, and wetland habitat and therefore would have negligible impacts on the wildlife that use these habitats. Alternatives A3 and A7 would have a minor impact on agricultural habitat. Table 4-1 describes the acres of each habitat type impacted by segment and alternative; Figures 4-3a and 4-3b illustrate land use that would be impacted within each Action Alternative's permanent area of impact.

Each Action Alternative would provide wider bridges and culverts than those in the existing roadway, allowing for increased wildlife habitat connectivity on either side of N-12 (Appendix B has a detailed list of the existing drainage structures and those proposed for each Action Alternative). Most of the culverts proposed for the Action Alternatives are single, twin, triple, and quad concrete box culverts that range in width from 5 feet to 14 feet. Alternatives A1 and A2 would have four bridges in the west segment, with spans ranging in length from 90 feet to 280 feet, and one bridge in the east segment with spans of 920 feet and 1,020 feet for each alternative, respectively. Alternative A3 would have five bridges along the west segment with spans ranging from 150 feet to 300 feet, and one bridge along the east segment with a span of 1,020 feet. Alternative A7 would have eight bridges along the west segment with spans ranging in length from 150 feet to 950 feet. The east segment of A7 would have six bridges with spans ranging in length from 525 feet to 1,400 feet.

Compared to existing conditions, Alternatives A3 and A7, which would both be located on the same alignment, would have beneficial impacts on small mammals and reptiles; these alternatives would provide increased connectivity to either side of the N-12 roadway and would remove the existing roadway in the floodplain. Alternative A7 would have additional beneficial impacts on wildlife because this alternative would have more bridges and would provide better connectivity under the roadway for larger mammals than does the existing roadway. Both Alternatives A3 and A7 would be constructed along the base of the bluffs and would result in segments of a new transportation corridor stretching through habitats where there is currently no roadway. Bashore, Tzilkowski, and Bellis (1985) found that over several years, vehicle and deer collisions occurred around specific sites and that woodland-field/grassland interfaces were areas of extremely high vehicle and deer collisions.

Alternatives A3 and A7 would further bisect woodland bluff habitat, floodplain wetland, agricultural field, and grassland habitat, increasing edge effects and potentially increasing vehicle and deer collisions. However, Alternative A7 may allow increased passage under its bridges.

Studies have documented that traffic noise does affect wildlife negatively; negative effects include hearing loss, increase in stress hormones, altered behaviors, interference with communication during breeding activities, differential sensitivity to different frequencies, and deleterious effects on food supply or other habitat attribute (Forman and Alexander 1998). However, the effect of any of the Action Alternatives is likely to be the same as existing conditions because a new roadway is not anticipated to increase the number of cars that travel through the Study Area and because all of the Action Alternatives are occurring in the floodplain.

Measures proposed to avoid, minimize, and mitigate adverse effects, as applicable, are described in Chapter 5.0.

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Table 4-1
Impacts of Action Alternatives on Wildlife Habitat (Acres)

Action Alternative	Habitat Type											
	Agricultural ¹			Woodland ²			Grassland/Rangeland ³			Wetlands and Open Water ⁴		
	West	East	Total	West	East	Total	West	East	Total	West	East	Total
Alternative A1	1	1	2	4	4	8	4	10	14	72	75	147
Alternative A2	1	5	6	2	12	14	5	16	21	71	71	142
Alternative A3	15	8	23	35	32	67	13	43	56	57	65	122
Alternative A7 (Applied-for Project)	15	8	23	35	32	67	13	43	56	45	46	91

Notes:

- ¹ For this analysis, non-wetlands used for crop production are reported separately as agricultural land. Habitat impacts were calculated using the area in the proposed right-of-way (ROW) that is outside of existing ROW.
- ² Woodland, also referred to as forestland, is defined as a land cover or use that is “at least 10 percent stocked by single stemmed woody species of any size which will be at least 4 meters (13 feet) tall at maturity” (USDA 2013). Habitat impacts were calculated using the area in the proposed ROW that is outside of existing ROW.
- ³ Rangeland is defined as a land cover or use in which “the climax or potential plant cover is composed principally of native grasses, grass-like plants, forbs or shrubs suitable for grazing and browsing” (USDA 2013). Habitat impacts were calculated using the area in the proposed ROW that is outside of existing ROW.
- ⁴ For information regarding impacts on specific wetland types, see Section 4.5, Wetlands and Other Waters of the U.S., of the Draft EIS. Habitat impacts were calculated using the area of permanent impact.

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4.3 PROTECTED SPECIES

Impacts on protected species were evaluated by considering potential habitat, the likelihood of a species occurring in the Study Area, and physical impacts (such as increased sedimentation and runoff) caused by construction and operation of a transportation corridor. A Biological Assessment was prepared for NDOR's Applied-for Project to address impacts on federally listed (threatened or endangered) species in accordance with Section 7(a) of the ESA (see Appendix L). The potential for and extent of impacts on federally listed species are described using accepted ESA terminology. Potential impacts on state-listed only species are described similarly, although they are not subject to Section 7(a) of the ESA.

Protected species resources effects were classified the conclusions as described in the following (USFWS and National Marine Fisheries Service 1998):

- No effect – The appropriate conclusion when the action agency determines its proposed action would not affect a listed species or designated critical habitat
- May affect – The appropriate conclusion when a proposed action may pose any effects on listed species or designated critical habitat. When a federal agency proposing the action determines that a may affect situation exists, then they must either initiate formal consultation or seek written concurrence from USFWS:
 - May affect, not likely to adversely affect – The appropriate conclusion when effects on listed species are expected to be discountable, insignificant, or completely beneficial. Beneficial effects are contemporaneous positive effects without any adverse effects on the species. Insignificant effects relate to the size of the impact and should never reach the scale where take occurs. Discountable effects are those extremely unlikely to occur. Based on best judgment, a person would not: 1) be able to meaningfully measure, detect, or evaluate insignificant effects; or 2) expect discountable effects to occur.
 - May affect, likely to adversely affect – The appropriate finding in a biological assessment (or conclusion during informal consultation) if any adverse effect on listed species may occur as a direct or indirect result of the proposed action or its interrelated or interdependent actions, and the effect is not discountable, insignificant, or beneficial.

4.3.1 No-Action Alternative

Under the No-Action Alternative, improvements to N-12 would not be constructed. The existence of the N-12 and associated routine roadway maintenance has no effect on protected species. Continued roadway maintenance would primarily occur within existing ROW and would not be expected to adversely affect protected species.

4.3.2 Species Not Affected by the Action Alternatives

The Action Alternatives would have no effect on the following species: bald eagle, piping plover, rufa red knot, pallid sturgeon, lake sturgeon, sturgeon chub, North American river otter, small white lady's slipper, and western prairie fringed orchid.

The Action Alternatives could improve habitat fragmentation for protected species because all of the Action Alternatives have more and larger culverts and bridges compared to the existing roadway.

The mortality impacts from vehicle and wildlife collisions are anticipated to be similar to existing conditions.

Bald Eagle

Bald eagles would tolerate moderate levels of noise and human disturbance around a roosting site but prefer low activity. The National Bald Eagle Management Guidelines provide recommendations for avoiding disturbance to nesting sites consistent with the BGEPA and the MBTA. In the vicinity of the project, bald eagles typically begin laying eggs in February and young are fledged by the end of August. The National Bald Eagle Management Guidelines recommend avoiding active nests during this period by a maximum distance of 660 feet if the activity would be visible from the nest (USFWS 2007).

Two active bald eagle nests are known to occur near the Study Area. One nest is located along the Niobrara River and is approximately 1 mile from any of the alternatives. The other nest is located several miles upstream of the confluence of the Missouri and Niobrara rivers. Neither of these nests would be impacted by any of the Action Alternatives because the nests exist outside of the Study Area and are located greater than 0.5 mile from each Action Alternative. All alternatives would have no effect on bald eagles in the Study Area.

Piping Plover

The Action Alternatives would have no effect on the piping plover because no suitable breeding or foraging habitat exists for this species within the Study Area.

Rufa Red Knot

The Action Alternatives would have no effect on the rufa red knot because no suitable foraging habitat exists for this species within the Study Area.

Pallid Sturgeon

There are no known occurrences of this species within the Study Area. It is not likely that this species would be encountered in the floodplain wetlands because the species prefers habitat in the deepest parts of fast-flowing rivers and the wetlands in the floodplain do not contain suitable habitat. Because of the direct hydrologic connection between the wetlands and the Missouri River, there is some potential during high water periods for accidental incursion into the Study Area. However, the habitat within the Study Area is not typically considered suitable for or preferable to the pallid sturgeon. Because of the lack of suitable habitat within the floodplain and bluff alternatives, all Action Alternatives would have no effect on pallid sturgeon.

Lake Sturgeon

There are no known occurrences of this species in the Study Area. Because lake sturgeon use similar habitat and have similar life histories to pallid sturgeon, the potential impacts on lake sturgeon from the Action Alternatives would be similar to those described above. All Action Alternatives would have no effect on lake sturgeon.

Sturgeon Chub

There are no known occurrences of sturgeon chub in the Fort Randall section of the Missouri River. Suitable habitat exists for the sturgeon chub; however, the preferred habitat of this species exists in the main channel of the Missouri River, not within the wetlands potentially impacted by the

Action Alternatives. Any use of the floodplain wetlands by sturgeon chub would be transient and migratory in nature. Due to the scarcity of this fish and the lack of suitable habitat within the Study Area, all Action Alternatives are not likely to impact sturgeon chub.

North American River Otter

Recorded occurrences of the North American river otter identify the species on the Niobrara River several miles upstream from the confluence of the Missouri River. However, this species is highly mobile and could be using habitat in the Missouri River. This species could occur in areas located along the Missouri River floodplain and associated tributaries. Although Alternatives A1, A2, A3, and A7 exist in the floodplain, it is not likely that these alternatives would adversely affect North American river otters because they are a very mobile species and would likely avoid areas of construction. All Action Alternatives could cause mortality to North American river otters from vehicle and wildlife collisions; however, all Action Alternatives would incorporate several wide bridges and culverts to facilitate fish and wildlife movement under the roadway to avoid vehicle and wildlife collisions. Additionally, no vehicle and otter collisions have been reported or documented throughout the existence of the N-12 roadway. All Action Alternatives are not likely to impact North American river otters.

Small White Lady's Slipper

No known populations of small white lady's slipper occur in the Study Area. All Action Alternatives would have no effect on the small white lady's slipper because the Study Area contains no suitable habitat for the species.

Western Prairie Fringed Orchid

No known populations of western prairie fringed orchid occur in the Study Area. All Action Alternatives would have no effect on the western prairie fringed orchid because the Study Area contains no suitable habitat for the species.

4.3.3 Species That Are Affected by the Action Alternatives

Interior Least Tern

Although interior least terns may use the Missouri River corridor and the Niobrara River during migration and breeding seasons, the Missouri River wetlands in the vicinity of the Action Alternatives, while connected to the river hydrologically, do not contain suitable breeding or nesting habitat for this species. The Action Alternatives would impact approximately 91 and 147 acres of wetlands and open waters. Since interior least terns may forage long distances from their nests for minnows or small fish, the amount of impacts is considered insignificant and discountable because these impacts would occur to less than 2 percent of the total wetland habitat, both within the Study Area and downstream to the Lake delta. Thousands of acres of additional habitat are available within the interior least tern's range. Therefore, the Action Alternatives may affect, but are not likely to adversely affect, interior least terns.

Whooping Crane

Whooping cranes may use the Missouri River corridor, associated tributaries, and the Niobrara River during migration; however, the Study Area is located on the eastern edge of the central flyway used by this species. The Action Alternatives would impact approximately 88 and 147 acres of wetlands and open waters. Such impacts could indirectly affect whooping cranes, which may forage in these

areas; however, this slight amount of impact is not likely to adversely affect this species because these impacts would occur to less than 2 percent of the total wetland habitat within the Study Area and downstream to the Lake delta. Thousands of acres of additional foraging habitat are available within the whooping crane's range. Based on the rarity of sightings in the Study Area and relative location of the project to the central flyway within the Study Area, the Action Alternatives may affect, but are not likely to adversely affect, the whooping crane.

American Burying Beetle

The ABB is found in a variety of habitats. No strong correlation that ties soil type or land use to the ABB's habitat selection has been identified in Nebraskan occurrences of the species; however, adequate soil moisture levels appear to be critical (Hoback 2009). Although no documented occurrences exist within the Study Area, potential ABB habitat may be disturbed or lost during construction and operation of the N-12 roadway. Most likely, impacts would be due to construction, such as removal and compaction of soils that are important to the ABB's life cycle. Once earth has been compacted and pavement has been laid, the affected soil is unlikely to be suitable habitat for the ABB. Additionally, during earth work, appropriate-sized carrion for the ABB's food and reproduction requirement may be temporarily displaced.

Although the ABB uses a variety of habitats, the north-central Sandhills population of ABB appears to prefer grassland prairie; forest edge; open woodlands with grasslands; and mesic areas, such as wet meadows, streams, and wetlands in association with relatively undisturbed semi-arid sandhill and loam grasslands. The ABB would likely not be found in the deeper water wetland habitats located directly adjacent to the Missouri River floodplain because the ABB has never been described as occurring in deeper water wetland habitats in the literature (USFWS 2008). Based on this information, grasslands and woodlands along bluffs would be more suitable than the wetlands in the Action Alternatives, which are mostly inundated and too wet to provide suitable habitat for this species. To determine impacts on the ABB by alternative, woodland and grassland acres were calculated for each Action Alternative because these habitats could contain potential habitat within the Study Area.

Between 22 and 123 acres of potential ABB habitat could be impacted under the Action Alternatives, with more acres of grasslands and woodlands impacted in the east segment than in the west segment. When compared to the total acres of potential ABB habitat within the Study Area, all of the Action Alternatives would have a negligible effect because they are affecting less than 5 percent of all available potential habitat. A habitat survey would be conducted for this species prior to construction. If appropriate conservation conditions are followed, all Action Alternatives may affect, but are not likely to adversely affect, the ABB, if present.

Northern Long-Eared Bat

The Action Alternatives would impact between 8 and 67 acres of woodland habitat. There are 897 acres of woodland habitat within the Study Area, which means that only a maximum of 7 percent of the available habitat would be affected. A habitat survey would be conducted prior to construction. In addition, NDOR would be able to clear and grub the woodland areas outside of the northern long-eared bat's roosting season. Therefore, the Action Alternatives may affect, but are not likely to adversely affect, northern long-eared bats.

4.3.4 Summary of Impacts

The potential impacts on each protected species described in Appendix E are summarized in Table 4-2 (40 CFR 230.30, Threatened and Endangered Species).

**Table 4-2
Protected Species Impacts**

Common Name	Scientific Name	Status ¹	Project Impact
Birds			
Bald eagle ²	<i>Haliaeetus leucocephalus</i>	Protected under the Bald and Golden Eagle Protection Act	All Action Alternatives would have no effect on bald eagles in the Study Area.
Interior least tern	<i>Sterna anatillarum</i>	Federally listed as endangered	The Action Alternatives may affect, but are not likely to adversely affect, interior least terns.
Piping plover	<i>Charadrius melodus</i>	Federally listed as threatened	The Action Alternatives would have no effect on the piping plover because no suitable breeding or foraging habitat exists for this species within the Study Area.
Rufa red knot	<i>Calidris canutus rufa</i>	Federally listed as threatened	The Action Alternatives would have no effect on the rufa red knot because no suitable breeding or foraging habitat exists for this species within the Study Area.
Whooping crane	<i>Grus americana</i>	Federally listed as endangered	The Action Alternatives may affect, but are not likely to adversely affect, the whooping crane.
Insects			
American burying beetle (ABB)	<i>Nicrophorus americanus</i>	Federally listed as endangered	The Action Alternatives may affect, but are not likely to adversely affect, the ABB.
Fish			
Pallid sturgeon	<i>Scaphirhynchus albus</i>	Federally listed as endangered	All Action Alternatives would have no effect on pallid sturgeon.
Lake sturgeon ²	<i>Acipenser fulvescens</i>	State-listed as endangered; Federal species of concern	The Action Alternatives would have no effect on lake sturgeon.
Sturgeon chub ²	<i>Macrhybopsis geliba</i>	State-listed as endangered; Federal species of concern	The Action Alternatives may affect, but are not likely to impact sturgeon chub.
Mammals			
North American river otter ²	<i>Lutra canadensis</i>	State-listed as threatened	The Action Alternatives may affect, but are not likely to impact North American river otters.
Northern long-eared bat	<i>Myotis septentrionalis</i>	Federally listed as threatened	The Action Alternatives may affect, but are not likely to adversely affect northern long-eared bat.

Common Name	Scientific Name	Status ¹	Project Impact
Plants			
Small white lady's slipper ²	<i>Cypripedium candidum</i>	State-listed as threatened	The Action Alternatives would have no effect on the small white lady's slipper because the Study Area contains no suitable habitat for the species.
Western prairie fringed orchid	<i>Platanthera praecleara</i>	Federally listed as threatened	The Action Alternatives would have no effect on the Western prairie fringed orchid because the Study Area contains no suitable habitat for the species.

Notes:

¹ Federal and state (Nebraska) status unless otherwise noted.

² A determination of effect in accordance with requirements of Section 7 of the Endangered Species Act (ESA) is not required because this species is not federally listed as threatened or endangered. Section 7 of the ESA is the mechanism by which federal agencies ensure that the actions they take, including those they fund or authorize, do not jeopardize the existence of any listed species (U.S. Fish and Wildlife Service, ESA Section 7 Consultation).

Measures proposed to avoid, minimize, and mitigate adverse effects, as applicable, are described in Chapter 5.0.

4.4 WATER QUALITY

Water quality issues related to surface water were evaluated primarily by considering erosion of the roadway, roadway runoff, and roadway overtopping for the long-term use of the transportation facility. Water quality issues related to groundwater were evaluated by considering roadway runoff and the potential to affect groundwater quality and impacts on groundwater wells. Impacts on water quality due to roadway use and maintenance are considered indirect effects. Temporary impacts on water quality during construction are addressed in Section 4.13, Temporary Construction Impacts.

4.4.1 Surface Water

Criteria were selected to determine the effects of the alternatives on the surface water. A qualitative approach was utilized to determine the level of impact on the waterbodies. Typically, sources of pollutants either create loading that impairs or does not affect the waterbody. The following are the two levels of effect that were utilized to determine direct effects of each alternative on surface water were used:

- Negligible – no effect on water quality of the surface water resources. No contributions of pollutants due to no roadway being located in waterbodies or in the watershed.
- Major – effect of the contribution of pollutants from the roadway would degrade the water quality of any of the waterbodies within the Study Area.

Potential for Water Quality Impacts as a Result of Erosion

Under the No-Action Alternative, the effects of erosion on the roadway embankment would continue. In addition, maintenance activities would continue to uphold the integrity of the roadway embankment.

Alternatives A1, A2, A3, and A7 would be located adjacent to the Missouri River and wave action and high flows have the potential for periodic erosion of the roadway bed. The potential for erosion would be greatest during high flows, and erosion could contribute suspended particles to the Missouri River. Although erosion could occur with the Action Alternatives, in comparison to the existing N-12

roadway, the Action Alternatives have the following measures incorporated into the design to prevent erosion that would reduce the erosion potential of the Action Alternatives:

- Each Action Alternative would be constructed with the appropriate reinforcement, and routine maintenance activities, such as placement of additional riprap or backfill and compaction, would be conducted.
- For Alternative A2, a wave attenuation berm that is 30 feet in length with 15H:1V side slopes would be incorporated on the north side of the roadway into those sections where the alignment is south of existing N-12 (see Chapter 2.0, Figure 2-2c). The wave attenuation berm would be planted with vegetation and would incorporate the existing N-12 embankment. Where the new roadway would be located north of existing N-12 and thus no existing N-12 embankment is available, appropriate reinforcement would be used to reduce its potential to erode.

Potential for Water Quality Impacts as a Result of Roadway Runoff

As with the No-Action Alternative, Alternatives A1, A2, A3, and A7 would be located adjacent to the Missouri River; therefore, sediment, metals, oil, and grease could run off the roadway directly or indirectly into the Missouri River and its drainageways. Traction control, such as salt or sand,¹ applied to the roadway during the winter could also run directly into these waterbodies. The amount of roadway runoff for the Action Alternatives would be similar to the effects associated with the No-Action Alternative. However, under the Action Alternatives, the roadway would be expanded through widened shoulders, which would be constructed with a pervious material such as gravel and would allow groundwater infiltration. The widened shoulders would be approximately 6 to 8 feet wide with a vegetated embankment at 1H:6V side slopes. The length of the embankment would vary with the height of the roadway and the existing ground contours. The shoulder widened with a pervious material could potentially filter roadway runoff, creating a buffer for infiltration before the runoff flows into the roadside ditches.

Alternatives A1, A2, A3, and A7 would require the crossings at Ponca Creek, Harry Miller Creek, Medicine Creek, and Bazile Creek to be reconstructed to elevate the existing roadway. At these crossing locations, the bridges would be widened; however, no significant increase to the direct runoff from the existing bridges and culverts is anticipated for these alternatives.

Alternatives A3 and A7 would be located adjacent to the bluffs for portions of the alignment; therefore, there is a potential for a shadow effect on the roadway. A shadow effect occurs when the roadway is shielded from the sun for extended periods during the day. This is especially problematic in winter months as afternoon melting of snow and ice from a roadway would be reduced. A shadow effect on the roadway could require the application of additional traction control during the winter compared to the No-Action Alternative. Application of additional traction control could contribute to elevated suspended particles in the surrounding waterbodies.

Alternative A7 would follow the same alignment as Alternative A3 but would incorporate 1.8 miles of bridges. Longer bridges would require an increase in the effort for normal maintenance activities such as snow removal and the application of additional traction control, which could eventually flow into waterbodies such as the Missouri River. The length of the bridges could create issues with the

¹ For traction control, NDOR District 3 Maintenance typically uses a salt brine which is 23 percent salt and 77 percent water until temperatures get below 15 degrees, at which point they use a 1:1 mixture of salt and gravel.

capture of direct runoff from the roadways; a longer bridge would not have the slope to drain off to the roadside ditches (40 CFR 230.21; 40 CFR 230.22).

Potential for Water Quality Impacts as a Result of Roadway Overtopping

Under the No-Action Alternative, existing N-12 would remain unchanged, and overtopping of portions of the current alignment would continue. During overtopping occurrences, erosion of the roadway can occur, causing sediment to enter the waterways. As a result, water quality would be impacted by the elevated suspended particles in the waterbodies. Traction control, such as salt or sand, applied to the existing roadway could run directly into the Missouri River and its drainageways, resulting in elevated suspended particles in the waterbodies. For Alternatives A1, A2, A3, and A7, which would raise the existing N-12 roadway, the water quality issues during times of overtopping would be eliminated.

No-Action Alternative

The project would not be built under the No-Action Alternative, and current roadway embankment erosion, runoff and overtopping would continue in the Study Area. Sediment, metals, oil, and grease do run off from the existing roadway during times of precipitation. However, no known water quality issues have been identified for the Missouri River and its tributaries, with the exception of Ponca Creek. Ponca Creek is currently listed as an impaired waterway, with selenium as the parameter of concern. The current roadway is not a contributor of Selenium. Therefore, water quality would not change from current conditions and the existing roadway would continue to have a negligible effect for surface waters.

Action Alternatives

The Action Alternatives would eliminate overtopping. The contribution of sediment to the adjacent waterbodies due to erosion would be minimized by the incorporation of the appropriate reinforcements. Roadway runoff would occur during times of precipitation; therefore, sediment, metals, oil, and grease could be contributing to the adjacent waterbodies. The incorporation of wider shoulders and vegetated embankments would provide opportunity for the roadway runoff to be filtered, with the exception of Alternative A7. The runoff from the longer bridges would enter directly into the Missouri River, similar to portions of the roadway under the No-Action Alternative. The amount of roadway runoff for the Action Alternatives would be similar to the effects associated with the No-Action Alternative. The Action Alternatives would have a similar effect on surface waters as the No-Action Alternative. Therefore, it is anticipated that the Action Alternatives would have a negligible effect on surface waters (40 CFR 230.21; 40 CFR 230.22).

Measures proposed to avoid, minimize, and mitigate adverse effects, as applicable, are described in Chapter 5.0.

4.4.2 Groundwater

The following levels of effect were determined for the direct effects of each alternative on groundwater were used:

- Negligible – no effects on groundwater resources. No roadway runoff would be present within area that shallow aquifers or recharge areas are present.
- Major – effect on groundwater resources cause degradation in the water quality and aquifers fail to meet drinking water standards due to the roadway near or within shallow aquifer or recharge areas.

No-Action Alternative

Under the No-Action Alternative, the groundwater quality would not change from current conditions. Therefore, the No-Action Alternative would have a negligible effect on groundwater in the area because the groundwater in the area currently meets drinking water standards.

Action Alternatives

Under the Action Alternatives, impacts caused by runoff would be no greater than impacts caused by runoff from the existing N-12 roadway. The shoulders of each Action Alternative would be wider than those of the existing N-12 roadway. This additional area would be constructed with a pervious material that would allow the roadway runoff to filtrate before reaching the roadside ditches, thereby allowing the roadway runoff to gradually recharge the groundwater. Review of municipal and public wells in the Study Area did not identify any instances of groundwater exceeding NDEQ drinking water standards. No groundwater contamination has been reported in the Study Area, although two high risk properties for regulated materials were reported. The high risk properties listed one site that was a previous landfill that accepted hazardous materials and one site that was a previous medical devices site that generated hazardous materials. Therefore, the Action Alternatives are anticipated to have a negligible effect on groundwater because the existing roadway has not affected the aquifers in the Study Area.

Water wells (registered or unregistered with NDEQ) within the proposed ROW (see Figure 4-2a and 4-2b) would be decommissioned by a licensed water well contractor or pump installation contractor as specified in the Nebraska Department of Health and Human Services regulations under Nebraska Administrative Code Title 178, Water Well Standards, Chapter 12, Water Well Construction, Pump Installation, and Water Well Decommissioning Standards. Proper decommissioning of affected wells would not significantly impact groundwater quality (40 CFR 230.50).

4.5 WETLANDS AND OTHER WATERS OF THE U.S.

The impacts on wetlands and other waters of the U.S. (waterways) associated with the alternatives are discussed below, and temporary effects on wetlands and other waters of the U.S. are addressed in Section 4.13, Temporary Construction Impacts. The 2W Sheets, which can be provided upon request, show the wetlands and other waters of the U.S. located within the Study Area. See Appendix F for more detailed figures showing wetland types located within the Study Area by alternative and by segment.

Impacts on wetlands and other waters of the U.S. (waterways) include benefits (positive effects) resulting from the alternatives as well as impacts that are negative.

Impacts on wetlands were classified into threshold categories, the lower limits of which are based on acreage thresholds of the Corps' permitting program and the upper limits of which are based on the amount of wetland impacts the Corps has permitted in the past. A qualitative scale was developed to describe the permanent effects each alternative may have on wetlands and waters of the U.S. The scale values are as follows:

What is a wetland?

Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and under normal circumstances to support, a prevalence of vegetation typically adapted for life in saturated soil conditions. (33 CFR 328)

What is a water of the U.S.?

Waters of the U.S., including wetlands, waterways, lakes, natural ponds, and impoundments, are regulated by the Corps under Section 404 of the Clean Water Act, which requires a permit to authorize the discharge or dredged or fill material into waters of the U.S. (33 USC 1344)

- Negligible – Wetlands and other waters of the U.S. would not be directly affected, or less than 0.5 acre would be permanently impacted (for example, minimal impacts on wetlands comparable to the issuance under a Nationwide Permit)
- Minor – Between 0.5 acre and 5 acres of wetlands would be permanently impacted (for example, Individual Permit with Environmental Assessment [EA])
- Moderate – Between 5 acres and 20 acres of wetlands would be permanently impacted (for example, larger Individual Permit with EA or EIS)
- Major – Greater than 20 acres of wetlands would be permanently impacted (for example, major Individual Permit with EIS)

Impacts on waterways were classified into threshold categories, the lower limits of which are based on the 2012 State of Nebraska regional conditions for nationwide permits and the upper limits of which are based on the amount of waterway impacts the Corps has permitted in the past. A qualitative scale was developed to describe the permanent effects each alternative may have on streams. The scale values are as follows:

- Negligible – Waterways would not be directly affected, or less than 300 linear feet of stream channel would be impacted.
- Minor – Between 300 and 400 linear feet of channel would be impacted.
- Moderate – Between 400 and 500 linear feet of channel would be impacted.
- Major – More than 500 linear feet of channel would be impacted.

4.5.1 No-Action Alternative

Wetlands

The No-Action Alternative would have a negligible impact on wetlands or other waters of the U.S. because no new roadway would be constructed. Reasonably foreseeable future road improvement projects would need to occur along N-12 as siltation continues and flooding of the roadway is expected to persist. These future road improvement projects may impact existing wetlands and other waters of the U.S. Wetlands would likely continue to develop and expand in the floodplain due to sediment deposition and rising groundwater levels in the area.

Waterways

The No-Action Alternative would have a negligible impact on waterways because no new roadway would be constructed. As it relates to the existing roadway's ability to convey stream flow, no impact on waterways has been identified. Reasonably foreseeable future road improvement projects would need to occur along N-12 as siltation continues and flooding of the roadway is expected to persist. These future road improvement projects may impact existing waterways.

4.5.2 Action Alternatives

Wetlands

The direct impacts on palustrine wetlands that would result from each alternative, by segment, are shown in Table 4-3. Table 4-3 displays the direct effects of the Action Alternatives on six classifications of palustrine wetlands identified within the Study Area. It is assumed that all wetlands within the permanent area of impact would be permanently impacted. The project would include

temporary areas of impact, which would include activities associated with the project that would be removed before project completion. The temporarily impacted areas would be restored to as close to original conditions as possible. Temporary impacts on wetlands and waterways are presented in Section 4.13, Temporary Construction Impacts.

Wetlands identified within the permanent area of impact were grouped into six classifications based on *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin et al. 1979). The eight wetland classifications are as follows:

- PUBG (Open Water) – This classification has been labeled as Open Water and consists of wetlands that are classified as palustrine unconsolidated bottom intermittently exposed.
- PEMA – This classification represents a palustrine emergent temporarily flooded wetland. More generally, PEMA wetlands are dominated by herbaceous vegetation that is adapted to growing in both saturated and upland soils, such as reed canarygrass (*Phalaris arundinacea*).
- PEMC – Wetlands identified as PEMC are dominated by emergent vegetation and display a seasonally flooded hydrologic regime. This classification of wetland is similar to PEMA but often displays vegetation that is more suited for extended periods of saturation.
- PEMF – This classification of wetland is similar to the two previously listed wetland classifications in that it describes a palustrine system that is dominated by emergent vegetation. However, unlike PEMA and PEMC, this classification describes wetlands that are semi-permanently flooded, with surface water present throughout the growing season. More generally, the PEMF wetlands identified in the Study Area were commonly found adjacent to open water and consist of vegetation adapted to long periods of inundation, such as cattail (*Typha latifolia*).
- PSSA – This classification represents a palustrine system that is dominated by scrub-shrub vegetation and a temporarily flooded hydrologic regime. The shrub stratum includes woody plants that are less than 20 feet tall (Cowardin et al. 1979). The categorization of a scrub-shrub wetland requires that the shrub layer have an areal coverage of 30 percent or more and that the shrub layer constitute the uppermost layer of vegetation (Cowardin et al. 1979).
- PFOA – This classification is described as a palustrine system that is dominated by forested vegetation and a temporarily flooded hydrologic regime. The distinction between a forested and shrub wetland is that the forested layer (woody vegetation that is 20 feet or taller) displays an areal coverage of 30 percent or more and is the uppermost layer of vegetation (Cowardin et al. 1979).

Table 4-3
Permanent Impacts on Wetlands and Open Water

Type ¹	Alternative A1 (acres)		Alternative A2 (acres)		Alternative A3 (acres)		Alternative A7 (Applied-for Project) (acres)	
	West	East	West	East	West	East	West	East
PEMA	12.07	21.14	19.96	18.64	13.73	21.01	13.65	19.12
PEMC	4.78	13.61	3.45	14.86	3.72	13.89	3.71	9.80
PEMF	37.90	23.20	36.99	25.10	33.76	15.78	24.41	9.96
PSSA	0.25	0.47	0.09	0.67	0.00	0.65	0.00	0.65
PFOA	0.00	4.12	0.00	3.64	0.21	4.09	0.21	4.19
PUBG (Open Water)	16.81	13.07	10.52	8.37	6.03	9.39	2.84	2.31
Total Wetlands	71.81	75.61	71.01	71.28	57.45	64.81	44.82	46.03
	147.42		142.29		122.26		90.85	

Note:

¹ PEMA = Palustrine Emergent Temporarily Flooded; PEMC = Palustrine Emergent Seasonally Flooded; PEMF = Palustrine Emergent Semi-permanently Flooded; PSSA = Palustrine Scrub-Shrub Temporarily Flooded; PFOA = Palustrine Forested Temporarily Flooded; PUBG = Palustrine Unconsolidated Bottom Intermittently Flooded

Source: Alfred Benesch & Company 2015

Each of the four Action Alternatives would have a major impact on wetlands, with each alternative impacting more than 20 acres. Despite these impacts, rising groundwater levels and continued siltation of the Missouri River floodplain would likely develop additional wetlands in other areas over time (see Section 3.5.1).

Under Alternative A3 and A7, where the new alignment deviates from the exiting N-12 alignment, the N-12 roadway would be removed to the existing ground level. These locations are the same for both of these alternatives. Roadway removal includes all pavement and roadway embankment. It is assumed that the removal of the roadway would result in the reclamation of the roadway footprint to a land use the mimics the adjacent land use. Wetlands are adjacent to the existing roadway in multiple and extended areas. Based on the locations of existing wetland adjacent to the existing N-12 roadway that would be removed to ground level under Alternative A3 and A7, a total of approximately 70 acres of wetlands (including open water) would be expected to be reclaimed.

The Action Alternatives were assessed for their indirect effects on wetlands. Fragmentation of wetlands or a change in wetland hydrology could lead to indirect effects of the Action Alternatives on fish and aquatic resources. While there would be some localized fragmentation of wetlands under Alternatives A1 and A2, impacts would occur in areas where fragmentation already exists. For Alternatives A3 and A7, while new areas of localized fragmentation may occur, the subsequent removal of the exiting roadway would decrease existing fragmentation. Fragmentation under Alternative A7 is minimized further due to the increased number and length of bridges incorporated into the design.

At a larger floodplain scale, the wetlands may have increased function under all Action Alternatives due to increased connection from more and larger culverts, or in the case of Alternatives A3 and A7, removal of the existing roadway. None of the Action Alternatives would alter wetland hydrology within the floodplain (see Section 4.6).

Waterways

The direct impacts on waterways that would result from each Action Alternative are shown in Table 4-4. Impacts on waterways would result from the removal and installment of culverts and bridges. The estimated linear feet of waterways affected are based on a wetland determination.

**Table 4-4
Permanent Impacts on Waterways**

	Channel Impact (linear feet) ¹
Alternative A1	1,969
Alternative A2	2,741
Alternative A3	2,763
Alternative A7 (Applied-for Project)	2,763

*Note:*¹ Channel impacts includes both length of channel filled and length of channel changed.

Source: Alfred Benesch & Company 2015

The four Action Alternatives would have a major impact on waterways, with each alternative resulting in more than 500 feet of channel impact.

Indirect effects can result from the loss of channel length, habitat fragmentation and alteration of hydrology. None of the Action Alternatives would result in a net loss of channel length. Habitat fragmentation may occur when portions of a natural channel are placed within a culvert (Appendix B provides details of the number and lengths of culverts). Culvert lengths would be increasing under each Action Alternative compared to the existing condition. Culverts are already in place in Alternative A1 and A2. Under Alternative A3 and A7, while new areas of natural channel would be placed in a culvert, the removal of existing culverts associated with the removal of the existing roadway would also occur.

Measures proposed to avoid, minimize, and mitigate adverse effects, as applicable, are described in Chapter 5.0.

4.6 FLOODPLAINS

As discussed in Section 3.6, Floodplains, FEMA has mapped the 100-year floodplain for the surface waters in the Study Area, which include the Missouri River and its unnamed drainageways, Ponca Creek, Harry Miller Creek, Medicine Creek, and Bazile Creek. Figures 4-1a through 4-4b show the surface waters, their associated floodplains, interior drainage areas, and each Action Alternative's permanent area of impact. Floodplain impacts are identified with respect to the encroachment on the 100-year floodplains.

A qualitative scale was developed to describe the effects each alternative may have on the available Missouri River floodplain storage and the Lake storage within the Study Area. The scale values are as follows:

- Negligible – Potential effect would result in a change of less than 5 percent. Due to the simplifying assumptions utilized for this concept-level assessment, neither positive nor negative attributes would be assigned to a change of less than 5 percent.
- Minor – Potential effect would result in a positive or negative change of greater than 5 percent but less than 15 percent.
- Moderate – Potential effect would result in a positive or negative change of greater than 15 percent but less than 25 percent.
- Major – Potential effect would result in a positive or negative change greater than 25 percent.

Effects on Corps flowage easements are described in acres of total impact.

4.6.1 No-Action Alternative

The existing N-12 roadway crosses the floodplain of the Missouri River and its unnamed drainageways as well as the floodplains of Ponca Creek, Harry Miller Creek, Medicine Creek, and Bazile Creek. Under the No-Action Alternative, flooding of the exiting N-12 roadway associated with the Missouri River and the Lake would continue (40 CFR 230.23). The No-Action Alternative would affect less than one-tenth of 1 percent of the flood storage area. This would be a negligible effect on the Missouri River floodplain storage, Missouri River conveyance, and the Lake storage. Future maintenance activities would have no effect on Missouri River floodplain storage, Missouri River conveyance, and the Lake storage.

4.6.2 Action Alternatives

Floodplain Encroachment

Alternatives A1, A2, A3, and A7 would cross the Missouri River floodplain extending south from the Missouri River, which flows parallel to the project, as well as the floodplain of the tributaries (Ponca Creek, Harry Miller Creek, Medicine Creek, and Bazile Creek) associated with the Missouri River (see Figure 4-1a through 4-4b). Each Action Alternative requires additional fill material in the floodplain to raise the roadway elevation. The Missouri River floodplain within the Study Area is approximately 1 to 2 miles wide, is approximately 9 miles long, and has an area of 1,739 acres. Therefore, the acres of encroachment for each Action Alternative, as shown in Table 4-5, are minor compared to the total acres of the Missouri River floodplain in the Study Area.

**Table 4-5
Encroachment of the Action Alternatives on the 100-Year Floodplain**

Action Alternative	100-Year Floodplain (acres)			Percent of Total Floodplain in the Study Area ¹
	West Segment	East Segment	Total	
Alternative A1	96	57	153	9%
Alternative A2	98	59	157	9%
Alternative A3	116	42	158	9%
Alternative A7 (Applied-for Project)	105	27	132	8%

Note:

¹ Based on 1,739 acres of 100-year floodplain within the N-12 Study Area.

Under Alternative A3 and A7, the existing N-12 roadway would be removed. A total of approximately 50 acres of existing N-12 roadway within the 100-year floodplain would be removed.

No indirect effects of floodplain encroachment are anticipated because the direct effects are minor.

While determining the acres of floodplain encroachment provides some quantification of potential to impact the 100-year floodplain, it does not provide a complete analysis of the potential effects on flood events. Therefore, an analysis of Missouri River conveyance and floodplain storage was performed.

Missouri River Conveyance

No detailed floodplain modeling of the Missouri River has been performed and there is no delineated floodway. To perform an analysis on the potential impact of each Action Alternative on Missouri River conveyance, approximate water surface elevations were obtained from the Corps. An assumption was made that that floodway boundary of the Missouri River would not be landward (south of) the existing N-12 roadway embankment. Because it is assumed for this assessment that the existing N-12 embankment would serve as the floodway boundary, development along the existing N-12 alignment and landward would not affect the conveyance of the Missouri River for the 1 Percent Flood (see Appendix H for the detailed analysis).

Therefore, all of the Action Alternatives would have a negligible effect on the capacity of the Missouri River to convey the 1 Percent Flood.

No indirect effects of Missouri River conveyance are anticipated, because the direct effects are negligible.

Missouri River Floodplain Storage

There are two elements to consider when determining effects of the Action Alternatives on Missouri River floodplain storage. The first element to consider is the effects on the total volume of floodplain storage, and the second element to consider is the effects an Action Alternative has to utilize the floodplain storage area.

The Missouri River flood storage volume was estimated using 1 Percent Flood water surface elevations and the approximate ground elevations provided for the alternatives at multiple locations to approximate the depth and width of the floodplain. Depth of floodwaters and the ground intercept point were used to approximate the end area at each cross section, and the average end area method was utilized to estimate the floodplain storage volume on the landward side of the existing N-12 alignment.

The estimated volume of proposed roadway fill that would be placed below the water surface in the floodplain was determined by comparing both the area of the typical roadway cross section below the water surface and the approximate road length in the floodplain to the total storage area volume.

Alternative A1 and A2 would remove approximately 0.22 percent of the available floodplain storage of a 1 Percent Flood. Alternative A3 and Alternative A7 would remove less than 0.15 percent of the available floodplain storage, but would also result in the removal of the existing roadway from the floodplain. For more details on the Missouri River floodplain storage assessment, see Appendix H.

The second component of analysis relative to effects on Missouri River floodplain storage addresses the ability of an alternative to allow flood flows to equalize, that is, to access flood storage areas on the landward side of a roadway. The No-Action Alternative and Alternatives A1 and A2 traverse the Missouri River flood storage area and have flood storage areas on both sides of the proposed roadway alignments. As there are no significant flood storage areas adjacent to the south side of Alternative A3

or A7, and because the existing roadway fill would be removed if these alternatives were selected, this assessment was not performed on these alternatives.

An assessment was performed on the size and number of culverts and bridges to determine the capacity to pass, or equalize, flood flows from one side of the roadway to another (see Appendix B for a listing of the existing and proposed structures).

Culvert and bridge capacity estimates only addressed the surface water portion of the equalization flows, which accounts for no more than 10 to 20 percent of the equalization flow rate; the remainder would be due to groundwater flow and effects. The bridges and culverts proposed for Alternatives A1 and A2 would have more capacity than the existing bridges and culverts so they would have a positive effect on floodplain storage equalization. Although Alternatives A1 and A2 would increase the culvert and bridge capacity, the roadway would no longer be overtopped during a 100-year flood event. Compared to existing conditions, Alternatives A1 and A2 would decrease the total surface water capacity and increase the resultant equalization time of flood flows from one side of the road to the other side of the road. Equalization times (under peak conditions) of Alternatives A1 and A2 would increase by as much as 2 weeks compared to equalization times under existing conditions; this equates to a moderately negative effect.

Alternatives A3 and A7 would not affect floodplain storage; therefore, equalization time is not a factor. Alternatives A3 and A7 have negligible effects on Missouri River floodplain storage.

As stated above, the roadway fill for the Action Alternatives represents less than 1 percent of the flood storage zones. The Action Alternatives are in a reach of the Missouri River with an un-numbered Zone A. Any development in the floodplain would require a floodplain development permit from Knox County and possibly from the communities of Verdel and Niobrara. The development of a floodplain permit may require additional analysis.

No indirect effects of Missouri River floodplain storage are anticipated because the negative direct effects are negligible.

Lewis and Clark Lake Storage

A linear project such as the N-12 project must be evaluated not only for the potential effects of actual displacement of storage due to the roadway fill placed in each of the three regulatory zones in the Lake, but also for the potential effects of any blockage or impedance to floodwaters flowing into floodplain storage areas. The flood storage volume directly displaced by the roadway fill in Zone 3 would be a small percentage, as described in detail in Appendix H; therefore, a more detailed analysis at this conceptual stage is not justified.

Similar to the analysis done for Missouri River floodplain storage, an analysis was performed for culvert and bridge capacity. Proposed culvert and bridge improvements identified for Alternates A1 and A2 were used to determine estimated capacity for proposed conditions. The Alternative A3 is not in the Lake regulatory zones, and the existing roadway would be removed.

As discussed relative to Missouri River floodplain conveyance, Alternatives A1 and A2, while increasing culvert and bridge capacity, the roadway would no longer be overtopped during a flood event. s would have a moderate negative effect due to elimination of the weir flow portion of the surface water component of equalization flow.

All of the alternatives would have a negligible effect on the Lake storage because removal of the existing roadway would allow equalization to occur concurrently with the water rise.

A positive effect on the Lake storage would be a decrease in the time required to equalize the landward-side water level to the level of the Lake regulatory zone, and a negative effect on the Lake

storage would be an increase in the time required to equalize the landward-side water level to the Lake regulatory zone.

Although the alternatives would have either a negligible effect or major positive effect, each would still need to satisfy the requirements for placement of fill in the Lake storage regulatory zone as stated in the Corps' "Land Development Guidance at Corps Reservoir Projects, Appendix A" found in Appendix H.

**Table 4-6
Summary of Effects on Conveyance and Storage**

Alternative	Missouri River Conveyance	Missouri River Floodplain Storage	Lewis and Clark Lake Storage
No-Action Alternative	Negligible	Negligible	Negligible
Alternatives A1 and A2	Negligible	Moderately Negative	Moderately Negative
Alternative A3 and A7	Negligible	Negligible	Negligible

No indirect effects of the Lake storage are anticipated because the direct effects are negligible.

Corps Flowage Easements

The Corps would need to consider the impacts of the placement of fill into existing Corps flowage easements and determine if replacement easements would be needed. Agreements between NDOR and the Corps would be needed. The following represents the acres of existing Corps flowage easements that would be impacted for each of the Action Alternatives:

- A1 – 30 acres (20 acres west segment, 10 acres east segment)
- A2 – 47 acres (31 acres west segment, 16 acres east segment)
- A3 – 85 acres (71 acres west segment, 14 acres east segment)
- A7 – 85 acres (71 acres west segment, 14 acres east segment)

4.7 VISUAL

Visual impacts on the existing environment were assessed by creating visual renderings from eight key observation points. Visual assessments used multiple viewpoints, such as the view from the driver on the roadway, from the river and its floodplain to the bluff, and from the bluff to the river and its floodplain. Appendix M (Visual Analysis Technical Memorandum) concludes the key observation points are:

1. Bazile Creek WMA
2. Missouri River Channel East
3. Missouri River Channel West
4. Running Water (boat access)
5. Chief Standing Bear Memorial Bridge East
6. Chief Standing Bear Memorial Bridge West
7. Niobrara State Park Group Lodge
8. Niobrara State Park High Point

The details of how the visual renderings were created using Light Detection and Ranging (LiDAR) data, National Elevation Dataset (NED) elevation data, project design data, Global Positioning System (GPS) points, and aerial imagery can be found in Appendix M.

An interdisciplinary team of the MNRR and NHT at NPS developed criteria to assess the visual impacts based on the renderings. The assessment compares the alternative to existing conditions. The thresholds to determine magnitude of effects on visual were:

- Negligible (1) – Likely to cause no change or a negligible change in scenic quality due to the visual contrast between the proposed project and the existing landscape conditions.
- Moderate (2) – Likely to cause a noticeable but not substantial change in scenic quality due to the visual contrast between the proposed project and the existing landscape conditions. Such a change would be noticeable to a sensitive viewer, but not all viewers.
- Major (3) – Likely to cause a substantial long-term and adverse effect on scenic quality, an existing viewshed, or key observation point due to the visual contrast between the proposed project and the existing landscape conditions.

4.7.1 No-Action Alternative

The No-Action Alternative would have a negligible long-term impact on the visual landscape. N-12 exists today in its current state and was in place when the 39-Mile District of the MNRR was designated. The east segment of N-12 from approximately mile marker (MM) 162.50 to MM 168.00 was paved in 1958. The west segment of N-12 from approximately MM 151.40 to 160.00 was paved in 1963 (Varilek 2015). However, the roadway would continue to deteriorate, requiring increasing maintenance activities. There would be short-term negligible impacts on the visual landscape while the roadway is under construction for routine maintenance.

4.7.2 Action Alternatives

None of the Action Alternatives would mar the beauty of the aquatic ecosystem in the vicinity of the project by degrading water quality, creating distracting disposal sites, inducing inappropriate development, or encouraging unplanned and incompatible human access. None of the Action Alternatives would affect the visual distinctiveness or diversity in the vicinity of the project (40 CFR 230.53).

Due to the distance at which the key observation points were established relative to the location of Alternatives A1 and A2, the identical proposed roadway elevations, and the proximity of these two alternatives horizontally, renderings were developed only for Alternative A2. Impacts identified from this assessment associated with Alternative A2 would be consistent to those for Alternative A1. Additionally, due to the distance at which the key observation points were established relative to the location of the Alternative A3 and A7, the identical proposed roadway elevations, and the identical roadway alignments, renderings were developed only for Alternative A3. Impacts identified from this assessment associated with Alternative A3 would be consistent to those for Alternative A7. Table 4-7 summarizes NPS's findings on the visual impact at each key observation point for the Action Alternatives.

Table 4-7
Level of Visual Impact by Action Alternative

Key Observation Point	Alternative A1/A2 ¹	Alternative A3/A7 ¹
Bazile Wildlife Management Area	2	1
Missouri River Channel East	1	1
Missouri River Channel West	1	1
Running Water	3	1
Chief Standing Bear Memorial Bridge East	3	1
Chief Standing Bear Memorial Bridge West	1	2
Niobrara State Park Group Lodge	1	1
Niobrara State Park High Point	1	1

Note:

¹ Levels of Visual Impact: 1 = Likely to cause no change or a negligible change in scenic quality due to the visual contrast between the proposed project and the existing landscape conditions. 2 = Likely to cause a noticeable but not substantial change in scenic quality due to the visual contrast between the proposed project and the existing landscape conditions. Such a change would be noticeable to a sensitive viewer, but not all viewers. 3 = Likely to cause a substantial long-term and adverse effect on scenic quality, an existing viewshed, or key observation point due to the visual contrast between the proposed project and the existing landscape conditions.

Source:

NPS. 2012. Letter from Michael T. Reynolds, Regional Director, NPS, to Becky Latka, Project Manager, Corps. November 9.

Alternatives A1 and A2

Alternatives A1 and A2 would be constructed on or adjacent to the existing roadway, so long-term impacts on the visual landscape would range from negligible to major. The Level 3 impacts from the Running Water and Chief Standing Bear Memorial Bridge East key observation points are due to a large cut along the vertical face of the bluff. Because these cuts are based on a preliminary design, NDOR could likely remove the need for these cuts during final design. At a higher elevation, the roadway may be visible from the river, but the bluffs are the dominant feature from the river, so the roadway would be a minor feature of the viewshed.

Alternative A1 involves the construction of a two-lane temporary roadway. Short-term impacts during construction are discussed in Section 4.13, Temporary Construction Impacts.

Alternatives A3 and A7

Alternatives A3 and A7 would be constructed at the base of the bluffs and its impact on the visual landscape would be negligible to moderate. In some areas, the alignment of these alternatives overlaps the alignment of Alternative A2. In these areas, the visual impacts would be similar to Alternative A2. In other areas, the roadway would be further away from the river, so the view of the river may be completely obstructed along some portions of the roadway and the roadway may not be as visible from the river. Finally, because these alternatives follow the base of the bluffs, the roadway would fall in the shadow of the bluffs. The bluffs are the dominant feature from the river, so the roadway would be a minor feature in the viewshed.

Indirect effects were assessed for all Action Alternatives. Because the road would remain in the floodplain under all of the Action Alternatives, the perceived quality of the natural environment and its aesthetic values would remain unchanged.

4.8 CULTURAL RESOURCES

Archaeological sites and historic structures have been identified within the APE of each alternative, which is defined as the permanent area of impact of each alternative (see Section 3.8). Some of these sites and structures are near or within the permanent area of impact of some of the alternatives. The proximity to the permanent area of impact and whether the site or structure is listed on, or is eligible for listing on, the NRHP were considered for determination of impacts according to Section 106 of the NHPA. Thresholds to determine magnitude were not established for this resource, because it appears that sites on or eligible for listing on the NRHP would be avoided.

4.8.1 No-Action Alternative

The No-Action Alternative would result in no effect on cultural resources resulting from the existence of N-12 or from routine maintenance actions.

4.8.2 Action Alternatives

The archaeological surveys completed for the project found that while Site 25KX2 (Minarik I) and Site 25KX9 (Minarik II) are within the APE of Alternatives A1, A2 and A3, these alternatives would have no adverse effect on these two archaeological sites (Ludwickson 2009). Alternative A7 has the same footprint as Alternative A3, so it is expected that Alternative A7 would have no adverse effect on Site 25KX2 (Minarik I) and Site 25KX9 (Minarik II).

None of the Action Alternatives would have a potential effect on site 25KX1 (Ponca Fort).

The historic property search revealed no significant properties (those either listed on or eligible for listing on the NRHP) within the permanent area of impact of any alternative (Dirr 2008). Consequently, none of the Action Alternatives would have a potential effect on historic structures.

4.8.3 Evaluation and Treatment of Other Facilities and Features

Project facilities such as borrow pits, waste disposal areas, and wetland mitigation sites not presently identified at this stage in the project would need to be evaluated for the presence of significant cultural resources.

4.9 RECREATION

Impacts on recreation considered potential impacts on the state lands, trails, and local recreation described in Chapter 3.0. Impacts on the MNRR are discussed previously in Section 4.1 and Appendix A, Preliminary Section 7(a) Evaluation, Wild and Scenic Rivers Act.

Effects on recreation resources are classified into the following four categories:

- Negligible – Adverse or beneficial effects on recreation due to physical disturbance are below the level of detection.
- Minor – Adverse or beneficial effects on recreation due to physical disturbance are less than 10 percent of the total acreage of Bazile Creek WMA.
- Moderate – Adverse or beneficial effects on recreation due to physical disturbance are greater than 10 percent and less than 25 percent of the total acreage of Bazile Creek WMA.
- Major – Adverse or beneficial effects on recreation due to physical disturbance are greater than 25 percent of the total acreage of Bazile Creek WMA.

4.9.1 No-Action Alternative

The No-Action Alternative could negatively affect visitor access to Niobrara State Park, Ferry Landing WMA, Bazile Creek WMA, and other recreation sites because N-12 is unreliable and would be subject to increased flooding.

4.9.2 Action Alternatives

None of the Action Alternatives would directly impact state lands, including the Verdel Landing WMA, Niobrara Townsite Boat Ramp, Ferry Landing WMA, and Lewis and Clark SRA; trails, including the NHT, George Shannon Trail, and Upper Missouri River Canoe Trail; or local recreation, including Niobrara Valley Golf Course, Whitetail River Lodge, Swanson Hunting Acres, and KSK Big Game Outfitters. None of the Action Alternatives would modify the aesthetic, educational, historical, recreational, and/or scientific qualities of any of the recreation sites (40 CFR 230.54).

NPS's Final General Management Plan for the MNRR does not specifically discuss new or improved roadways within the MNRR boundaries. However, the existing N-12 roadway is illustrated as being within the MNRR boundary, and the yet-to-be-built (at that time) Chief Standing Bear Memorial Bridge and the N-14 roadway realignment are noted (NPS 1997). For additional information on effects on the MNRR, see Section 4.1 and Appendix A.

The west segments of the Action Alternatives would not affect Bazile Creek WMA. The east segments of all of the Action Alternatives would have a negligible impact the Bazile Creek WMA state lands (see Figure 4-2b), calculated using the ROW. The east segments of the Action Alternatives would impact approximately 47 to 68 acres of the Bazile Creek WMA (the WMA is 4,424 acres in total area).

Overall, the conversion of Bazile Creek WMA land to roadway, as a result of the Action Alternatives, would not change how the area is used or managed for fishing, hunting, or trapping because the amount of impact is negligible (less than one-tenth of 1 percent) compared to total acres (4,424 acres). Access to Bazile Creek WMA would be maintained. Table 4-8 compares the impacts of each Action Alternative.

Table 4-8
Impacts on the Bazile Creek Wildlife Management Area

Action Alternative	Right-of-Way Required From Bazile Creek Wildlife Management Area (acres)	Percent of Bazile Creek Wildlife Management Area
A1	52	1
A2	47	1
A3	68	2
A7 (Applied-for Project)	68	2

The Action Alternatives would not disrupt breeding, spawning, migratory movements, or other critical life requirements of resident or transient fish and wildlife resources; instead, the Action Alternatives may improve these life requirements. The existing N-12 roadway was not originally designed to facilitate aquatic life movement from one side of the roadway to the other. All of the Action Alternatives provide larger culverts and longer bridges to provide increased floodplain connectivity.

The Action Alternatives would not create unplanned, easy and incompatible human access to remote aquatic areas. The Action Alternatives would replace an existing roadway that currently provides human access to remote aquatic areas. Alternative A7, in comparison to the other Action Alternatives, could create the need for the frequent maintenance activity of adding road salt and sand for traction control to the long bridges. Adding higher concentrations of road salt that may reach the surrounding wetlands and waterways is undesirable.

The project would not result in establishment of undesirable competitive species of plants and animals. All disturbed areas would be reseeded with native vegetation. No change to animal species assemblages is anticipated.

The Action Alternatives would slightly change the balance of water and land areas needed to provide cover, food, and other fish and wildlife habitat requirements, as discussed in Section 4.2, Fish and Wildlife. However, these changes in land use would not modify the way the Bazile Creek WMA is managed (40 CFR 230.40).

The Action Alternatives are not anticipated to have a significant impact on the suitability of recreational fishing grounds surrounding N-12 as habitat for populations of consumable aquatic organisms. No interference with fisheries reproductive success is anticipated. In the short term, there would be minor changes to water quality during construction, but adverse impacts on water quality would be avoided by the implementation of BMPs. In the long term, Alternative A7 would have increased use of road salt on its long bridges. The addition of a higher concentration of road salt into the ecosystem could cause chemical contamination (40 CFR 230.51).

The Action Alternatives are not anticipated to cause any measurable impacts on water-related recreation, because they would not alter the access to recreation properties or activities (40 CFR 230.52).

Indirect effects were assessed for all Action Alternatives. Because the road would remain in the floodplain under all of the Action Alternatives, the perceived quality of the natural environment and its recreational values would remain unchanged.

4.10 PEDESTRIANS, BICYCLISTS, AND CANOEISTS

Potential impacts were considered for pedestrians and bicyclists using the N-12 roadway, and for pedestrians, bicyclists, and canoeists using the recreational resources in the vicinity of N-12. No indirect effects on pedestrians, bicyclists, and canoeists were identified.

Effects on recreation resources are classified into the following four categories:

- Negligible – Adverse or beneficial effects on pedestrian, bicycle, or canoe trails due to physical disturbance are below the level of detection.
- Minor – Adverse or beneficial effects on pedestrian, bicycle, or canoe trails due to physical disturbance are less than 10 percent of the trail length.
- Moderate – Adverse or beneficial effects on pedestrian, bicycle, or canoe trails due to physical disturbance are greater than 10 percent and less than 25 percent of the trail length.
- Major – Adverse or beneficial effects on pedestrian, bicycle, or canoe trails due to physical disturbance are greater than 25 percent of the trail length.

4.10.1 No-Action Alternative

The No-Action Alternative would adversely impact bicyclists' use of N-12. Following the 1995 interim improvements of the roadway in the Study Area, the elevation of the roadway was increased by several feet and the resulting roadway is not consistent with Nebraska roadway design standards as it has inadequate shoulder width, steep roadway embankments, inadequate lane width, and vehicle width restrictions. Further details of the flooding issues and roadway improvements are discussed in Section 1.4, Need for the Project. Under this alternative, these issues would remain and would be a moderate impact on bicyclists.

4.10.2 Action Alternatives

None of the Action Alternatives would directly affect the trails at Niobrara State Park nor would they affect canoe trails. All of the Action Alternatives appear to be consistent with the comprehensive trails plan for Nebraska (RDG 2004). N-12 would be upgraded to 12-foot lane widths with 8-foot shoulder widths west of Niobrara and 6-foot shoulder widths east of Niobrara. In addition, all of the Action Alternatives would have a minor positive affect on bicyclists' use of N-12 because the roadway would meet design standards and could accommodate riders on 8-foot or 6-foot shoulders while decreasing interaction with vehicular traffic. A separate bike lane or barrier separation is not proposed. N-14 south of Niobrara and N-12 west of the Study Area are in the 28-foot-section program; the Action Alternatives would connect the current disruption in the 28-foot-section program (RDG 2004).

Alternative A1 may cause temporary minor disruption to bicyclists during construction (see Section 4.13, Temporary Construction Impacts).

Alternative A7 includes 1.8 miles of bridges. Shoulder widths on the bridges would be adequate for use by bicyclists. Bridges in the west segment would have a 6-foot shoulder width and bridges in the east segment would have an 8-foot shoulder width.

Indirect effects were assessed for all Action Alternatives. Because the road would remain in the floodplain under all of the Action Alternatives, the use of the project area for recreation would remain unchanged.

4.11 ACQUISITIONS AND RELOCATIONS

To assess the potential impacts associated with each alternative, ROW, acquisitions, and property relocations were evaluated based on the conceptual designs (NDOR 2015). The affected area for this analysis is the ROW limits beyond existing NDOR ROW and any parcels to which NDOR would be unable to maintain access. For parcels that NDOR would be unable to maintain access, NDOR would attempt to identify a willing buyer of the parcel that would have access from an adjoining property. Flowage easements would be affected as a result of construction of the Action Alternatives. Flowage easements are effected by fills within the permanent area of impact. Impacts on flowage easements are discussed in Appendix C. Table 4-9 lists the ROW and acquisitions required for each Action Alternative. No relocations would be required for any of the Action Alternatives.

What is flowage easement land?

Flowage easement land is privately owned land on which the United States government has acquired certain perpetual rights, including the right to flood it, the right to prohibit construction or maintenance of a habitable structure, and the right of ingress and egress across the land. Landowners may receive payments for the easement.

Magnitude of effect due to acquisitions and relocations are classified into the following categories:

- Negligible – less than 10 acres of new ROW is needed, no acquisitions or relocations are necessary.
- Minor – between 10 and 25 acres of new ROW is needed, less than 100 acres of acquisition is needed, no relocations are necessary.
- Moderate – between 25 and 100 acres of new ROW is needed, between 100 and 500 acres of acquisitions are needed, and/or less than 5 relocations are necessary.
- Major – more than 100 acres of new ROW is needed, more than 500 acres of acquisitions are needed, and/or more than 5 relocations are necessary.

4.11.1 No-Action Alternative

The No-Action Alternative would not require any new ROW or any acquisitions and relocations, except what may be required for any future projects in or near the Study Area.

4.11.2 Action Alternatives

Each of the Action Alternatives would result in a major effect due to the amount of new ROW and acres of acquisitions. Table 4-9 identifies the acres of new ROW and acquisition of parcels for which access is assumed to be eliminated. No relocations would be necessary for any of the Action Alternatives.

Under Alternative A1 and A2, access to existing properties would be maintained, and no acquisitions would be necessary.

Under Alternative A3 and A7, maintaining access to properties north of the proposed alignments was evaluated by NDOR because the existing roadway would be removed. At this stage of design, it was determined that access would not be maintained to all parcels from north of the existing alignment. Approximately 827 acres of land north of the Applied-for Project in the west segment is preliminarily assumed to have no access, therefore, it would be acquired by NDOR. NDOR would review each parcel during final design of the Applied-for Project (should a permit be issued) to determine on a case-by-case basis the feasibility of maintaining access. See Section 4.11.4 for a discussion of disposal of excess land. No acquisitions due to access restrictions were identified in the east segment. One farm-related outbuilding would be impacted by property acquisition in the east segment.

No indirect effects resulting from the acquisition of new ROW is anticipated. ROW would be maintained comparable to existing N-12 ROW. Excess lands would be offered back to other state, county, local agency, or public entities (see Section 4.11.4, Disposal of Excess Land Acquired in Fee).

Table 4-9
Right-of-Way and Acquisitions Required for Each Action Alternative

Alternative	New ROW (acres) West Segment	New ROW (acres) East Segment	New ROW (acres) Total	Acquisition of Parcels with No Access (acres)	Relocation(s)
A1	41	70	111	0	None identified
A2	55	77	132	0	None identified
A3	129	108	237	827	None identified
A7 (Applied-for Project)	129	108	237	827	None identified

Source:

NDOR. 2015. Niobrara E&W Alternative Design Information. April 3.

Note:

ROW = right-of way

4.11.3 Additional Assistance

At this time, there are no known relocations. If it is determined that the implementation of an Action Alternative affects housing of people with special needs or protections, efforts would be made to find suitable housing in accordance with Nebraska's relocation assistance services.

4.11.4 Disposal of Excess Land Acquired In Fee

Typically, when NDOR acquires lands in fee for the purpose of ROW or acquisitions, it determines how much of those lands are necessary for the maintenance of the roadway. Then, the excess land is appraised and offered first to state, county, or local agencies. If none of the agencies are interested the excess land is then put up for public auction.

Under Alternatives A3 and A7, the NDOR ROW staff would coordinate with Corps ROW staff relative to the disposition of excess lands from lack of access for potential incorporation into flowage easements if the properties are eligible.

4.12 PERMITS

Permits and approvals that would be required to implement the Applied-for Project are listed in Table 4-10.

Table 4-10
Permits and Approvals Required to Implement Applied-for Project

Permit or Approval	Granting Agency or Agencies	Reason
Section 404 permit, Clean Water Act	U.S. Army Corps of Engineers	Authorization is required for placement of dredged or fill material in wetlands or other waters of the U.S. In addition to this authorization for permanent impacts, Nationwide Permit 33 may be required for temporary impacts related to construction access.
Section 401 of the Clean Water Act, Water Quality Certification	Nebraska Department of Environmental Quality (NDEQ)	This certification is required as part of the Section 404 permit issuance. Section 401 of the Clean Water Act (33 United States Code [USC] 1341) requires that all discharges of fill material must be certified by the appropriate state agency as complying with applicable effluent limitations and water quality standards.
Section 401 of the Clean Water Act, Water Quality Certification on Tribal Land	U.S. Environmental Protection Agency (EPA)	On tribal lands, Section 401 water quality certifications are issued by EPA. EPA coordinates with the affected tribe to develop conditions for the water quality certification.
Section 7(a) Evaluation, Wild and Scenic Rivers Act	National Park Service (NPS), Missouri National Recreational River	An evaluation in accordance with Section 7(a) of the Wild and Scenic River Act must be prepared to comply with NPS for a water resources project. The purpose of this evaluation is to determine the compatibility of the proposed project with the Wild and Scenic Rivers Act when compared to existing conditions.
National Pollutant Discharge Elimination System (NPDES) general stormwater discharge permit for construction activities, Clean Water Act, including a Stormwater Pollution Prevention Plan (SWPPP)	Nebraska Department of Environmental Quality	The NPDES permit, required for construction sites greater than 1 acre in size, authorizes (with the implementation of permit-specified mitigation) the discharge of stormwater associated with activities from a construction site. A SWPPP is required under the general permit to help prevent stormwater pollution and control erosion and sedimentation.
Floodplain Development Permit, including no-rise certification	Knox County, Village of Niobrara	A Floodplain Development Permit must be obtained from state-designated agencies as authorized by the Federal Emergency Management Agency (FEMA) for various types of floodplain development as part of participation in the National Flood Insurance Program. It is anticipated that a no-rise certification would be obtained for any of the Action Alternatives; this certification would require coordination and approval from Knox County and the Village of Niobrara.

Permit or Approval	Granting Agency or Agencies	Reason
Section 7 of the Endangered Species Act	U.S. Fish and Wildlife Service (USFWS)	Section 7 consultation with USFWS must occur regarding potential impacts on federally listed threatened and endangered (T&E) species and federally designated critical habitat.
Nebraska Nongame and Endangered Species Conservation Act (NESCA)	Nebraska Game and Parks Commission (NGPC)	NESCA consultation with NGPC must occur regarding potential impacts on federally- and state-listed T&E species
Section 106 of the National Historic Preservation Act	Nebraska State Historic Preservation Office	Section 106 consultation must occur regarding potential impacts on archaeological sites and historic/architectural properties that are listed on or eligible for listing on the National Register of Historic Places.
Air Quality Construction Permit	Nebraska Department of Environmental Quality	This permit would be required if a new emission unit (such as a portable batch plant for paving applications) were needed for construction. Acquisition of this permit may be the responsibility of the roadway construction contractor.
Open Burning Permit	Nebraska Department of Environmental Quality	This permit would be required if any open burning were to occur in Nebraska as a result of the project.
Integrated Solid Waste Management Permit	Nebraska Department of Environmental Quality	Authorization from NDEQ is required for disposal of any hazardous waste or special waste. Disposal arrangements with local landfills would be required.

4.13 TEMPORARY CONSTRUCTION IMPACTS

The impacts of construction would be temporary as they would be limited to the period of construction (2 to 3 years) and the short time-frame required for the disturbed areas to be restored. The impacts during construction would be related to wild and scenic rivers; fish and wildlife; threatened or endangered species; water quality; wetlands and other waters of the U.S.; floodplains; visual; cultural resources; recreation; pedestrians, bicyclists, and canoeists; acquisitions and relocations; utilities; land use; noise; farmland; regulated materials; air quality; social factors; and economic factors. Because detailed discussion of specific construction impacts is not feasible until final design has been completed for the project, this section discusses general impacts of construction. Construction impacts are direct impacts; no indirect impacts were identified.

The location and type of borrow material required for the project would be identified during final design. If off-site borrow locations would be required, their type and location would be evaluated based on environmental conditions, regional hydrology, and instream flows to the Missouri River. Any required permits would be sought at that time.

All practical precautions would be taken to limit and minimize the temporary impacts of construction activities. Construction techniques for the non-bridge portion of the project would follow common highway construction procedures. Bridge construction would most likely consist of the use of temporary work pads and cofferdams for pier construction.

The following sections discuss temporary impacts on resources from construction. Avoidance, minimization, and mitigation strategies are summarized in Chapter 5.0.

4.13.1 Constructability

As discussed in Section 2.2.1. General Concepts, the bluffs south of the Missouri River floodplain contain the Pierre Shale geologic formation from 0 to 72 feet below the ground surface. The Pierre Shale geologic formation is documented as being susceptible to landslides, especially in northeastern Nebraska and eastern South Dakota. In combination with the Pierre Shale geologic formation, the following conditions occur in northeast Nebraska and facilitate increased landslide occurrences: 1) the topography is sloped to rugged; and 2) northeast Nebraska has precipitation events.

Alternatives A1, A2, A3, and A7 are primarily located outside of the areas containing the Pierre Shale geologic formation but may be affected by the Missouri River during high flows and releases from Fort Randall Dam.

4.13.2 Wild and Scenic Rivers

The Section 7(a) evaluation in Appendix A includes an assessment of NDOR's Applied-for Project, including short-term construction effects on the values for which the MNRR was designated under the Wild and Scenic Rivers Act.

4.13.3 Fish and Wildlife

Construction activities would temporarily disturb terrestrial wildlife through increased noise and human activities near the ROW. Wildlife within the ROW would seek sanctuary in nearby habitat during grading operations. Vegetation clearing activities would disturb or remove rangeland and woodland habitat. Vegetation clearing operations would disturb nesting migratory birds by clearing habitat if not conducted outside of the nesting season. Clearing and grubbing of woodland areas would remove roosting habitat for several species of birds.

Construction would temporarily impact fish and aquatic habitat in the tributaries during the construction of the crossings, which requires work in the main channel margins and associated wetlands near the waterways. Highway construction could affect fish and aquatic species with an increase in suspended sediment during construction. Temporary impacts on fish and aquatic species can occur when dewatering is needed for bridge construction. When water is encountered at a bridge pier location, coffer dams and dewatering are required before construction of the pilings and pier footings can begin. The coffer dams are constructed using sheet piling, and the water is then pumped out. Dewatering is required at the piers until enough of the pier columns or walls have been constructed that they extend above the water elevation. The coffer dams then are removed and the pier footings are backfilled.

Construction is not likely to adversely impact surface water quality due to soil disturbance for the construction of the roadway, bridges, and culverts. The construction of the Action Alternatives would meet the requirements for a NDEQ NPDES permit, and a SWPPP would be developed, therefore minimizing short-term and long-term effects on surface water and groundwater. Under the SWPPP, appropriate BMPs would be installed to protect and minimize impacts on surface waters and adjacent fish floodplain wetland habitats. Impacts from construction on water quality in fish and aquatic habitat are not likely to occur, but if they would occur, the impacts would be temporary and negligible.

Several species of birds protected under the MBTA, including bald eagles, occur in the Study Area. Migratory birds and bald eagles could be affected by construction directly as a result of increased noise and removal of habitat. Construction noise would be sporadic depending on the equipment used. Bald

For all resources, see Chapter 5.0 for avoidance, minimization, and mitigation measures that would be implemented as part of construction activities.

eagles are likely to return to the area once the more constant and lower noise levels from traffic replace the sporadic and louder noises of construction.

Each Action Alternative would result in temporary disturbances to vegetated habitat from construction of the roadway. Temporary effects on wildlife habitat would occur in areas that would be returned to their approximate original contour and revegetated following construction, such as staging areas. Construction activities and disturbed soils are susceptible to invasion and spread of noxious weeds. Temporarily impacted areas would be revegetated following construction according to NDOR's Roadside Planting Plan. Revegetation may increase the number of native species in these areas, which would offer a beneficial impact.

4.13.4 Protected Species

The species that could potentially occur within the Study Area are discussed in Section 4.3.2 and include the federally listed ABB, interior least tern, whooping crane, and northern long eared bat, and the state-listed sturgeon chub and North American river otter. Additional conservation measures for protected species implemented prior to or during construction may be proposed by either USFWS or NGPC as coordination continues on the project.

As discussed in Section 4.3.2, the piping plover, rufa red knot, pallid sturgeon, lake sturgeon, small white lady's slipper, and western prairie fringed orchid are not anticipated to be affected because suitable habitat is not within the Study Area.

4.13.5 Water Quality

Construction would temporarily impact surface water quality due to soil disturbance for the construction of the roadway, bridges, and culverts. Construction activities such as clearing, grading, trenching, and excavating would disturb soils and sediment. If not managed properly, disturbed soils and sediment can easily be washed into nearby waterbodies during storm events, reducing water quality. Section 438 of the Energy Independence and Security Act (EISA) (42 USC 17094) establishes into law new storm water design guidance requirements for federal construction projects that disturb a footprint greater than 5,000 square feet of land. Under the requirements of Section 438 of the EISA, predevelopment site hydrology must be maintained or restored to the maximum extent technically feasible with respect to temperature, rate volume, and duration of flow. Predevelopment hydrology would be modeled or calculated using recognized tools and must include site-specific factors such as soil type, ground cover, and ground slope. Site design would incorporate stormwater retention and reuse technologies such as bioretention areas, permeable pavements, cisterns and recycling, and green roofs to the maximum extent technically feasible.

NDEQ issues general permits that authorizes the discharge of stormwater associated with construction activities. The construction of the Action Alternatives would meet the requirements for the NDEQ NPDES permit, and a SWPPP would be developed, therefore preventing long-term effects on surface water and groundwater. See Section 4.12, Permits, for more information on NPDES and SWPPP requirements.

4.13.6 Wetlands and Other Waters of the U.S.

Construction would result in the filling of some wetlands and temporary disturbance of other wetlands. The temporary impacts on wetlands and open waters due to the construction of temporary roadways, construction staging, and construction of bridges are outlined in Table 4-11; and temporary impacts on waterways are summarized in Table 4-12. Any impacts due to construction for Alternatives A1, A2, A3, and A7 that would be within the alternatives' permanent area of impact are

assumed to be permanently impacted. The amount of wetlands estimated to be permanently filled during construction of the Action Alternatives is discussed in Section 4.5.2.

Table 4-11
Summary of Temporary Effects on Wetlands

Type ¹	Alternative A1 (acres)		Alternative A2 (acres)		Alternative A3 (acres)		Alternative A7 (Applied-for Project) (acres)	
	West	East	West	East	West	East	West	East
PEMA	0.07	0.37	0.06	0.37	0.05	0.37	0.05	1.71
PEMC	0.10	0.15	0.21	0.00	0.17	0.00	0.17	3.08
PEMF	0.00	0.25	0.00	0.05	0.21	0.05	5.92	3.17
PSSA	0.04	0.03	0.03	0.32	0.03	0.32	0.03	0.32
PFOA	0.00	0.84	0.00	2.45	0.00	2.16	0.00	2.16
PUBG (Open Water)	0.03	0.16	0.01	0.00	0.50	0.00	2.21	4.32
Total Wetlands	0.2	1.8	0.3	3.2	1.0	2.9	8.4	14.8
	2.0		3.5		3.9		23.2	

Note:

¹ PEMA = Palustrine Emergent Temporarily Flooded; PEMC = Palustrine Emergent Seasonally Flooded; PEMF = Palustrine Emergent Semi-permanently Flooded; PSSA = Palustrine Scrub-Shrub Temporarily Flooded; PFOA = Palustrine Forested Temporarily Flooded; PUBG = Palustrine Unconsolidated Bottom Intermittently Flooded

Source:

Alfred Benesch & Company 2015

Table 4-12
Summary of Temporary Effects on Waterways

Alternative A1		Alternative A2		Alternative A3		Alternative A7 (Applied-for Project)	
Temporary Channel Impact		Temporary Channel Impact		Temporary Channel Impact		Temporary Channel Impact	
Total (linear feet)	Total (acre)	Total (linear feet)	Total (acre)	Total (linear feet)	Total (acre)	Total (linear feet)	Total (acre)
626	0.61	1,041	0.56	953	0.56	953	0.56

Source:

Alfred Benesch & Company 2015

4.13.7 Floodplains

Construction would result in the temporary filling of some areas designated as floodplains. Alternative A1 would require a temporary roadway during construction; therefore, temporary fill would be placed within designated floodplain. These areas would be returned to pre-existing conditions; therefore, the impacts would be temporary.

4.13.8 Visual

The construction of a roadway, which is expected to take 2 to 3 years, would include temporary visual impacts such as the visibility of construction equipment and supplies. During construction, heavy

construction equipment would clear the ROW of vegetation, including adjacent to the Missouri River, and expose bare ground. Both the equipment and the resulting exposed surface would create adverse visual impacts. This temporary visual impact would be associated with each of the Action Alternatives and would be expected to last until construction is completed and the ROW is revegetated.

Alternative A1 is the only alternative that includes the construction of a temporary two-lane roadway for traffic maintenance while the roadway is under construction. The temporary roadway would be adjacent to the existing roadway and would include a series of crossovers to maintain traffic north of N-12. However, the location of the temporary roadway is within the permanent area of impacts. The visual impact of the temporary roadway would be short-term and most of the footprint would become the permanent footprint of Alternative A1.

4.13.9 Cultural Resources

During construction, there would be a possibility to encounter presently unknown buried archaeological deposits, including human burials. See Chapter 5.0, Section 5.13 for how inadvertent discoveries would be handled.

4.13.10 Recreation

During construction, there would be temporary impacts on recreation, such as an increase in noise levels throughout the Study Area and visible construction equipment in and around the permanent area of impact. The increased noise may be heard in Niobrara State Park, the MNRR, and Bazile Creek WMA. The construction would not disrupt access to Niobrara State Park or the MNRR. Access to Bazile Creek WMA during construction of the Action Alternatives would be maintained by staging the construction because the temporary roadway is located south of N-12 and the access is located north of N-12.

4.13.11 Pedestrians, Bicyclists, and Canoeists

Construction would not adversely impact pedestrians, bicyclists, and canoeists compared to existing N-12, which has inadequate shoulder width. Construction of Alternative A1 requires a two-lane temporary roadway with two 12-foot-wide lanes, a 6-foot-wide shoulder, and a 4-foot-wide shoulder. Bicyclists would be able to use the temporary roadway but would not be afforded the room that an 8-foot-wide shoulder provides. Under Alternatives A2, A3, and A7, pedestrians and bicyclists would use the existing highway shoulders during construction. The canoeists' routes would not be disrupted; however, canoeists may experience increased noise and construction visible from the Missouri and Niobrara rivers.

4.13.12 Acquisitions and Relocations

NDOR would be able to maintain access to the homes and businesses north of N-12 during construction with crossovers and by staging the construction.

4.13.13 Utilities

NDOR may inadvertently impact utilities during construction. For known utilities, all utilities in the area shall be notified of this project. Utilities shall be provided in project plans. Any utility adjustments or interruption of service due to relocations of the utility would be the responsibility of the Utility. Any environmental permits required for utility relocations shall be the responsibility of the Utility. If undocumented utilities are encountered, the owner of the undocumented utility would be contacted.

4.13.14 Land Use

Minor short-term impacts on land use are anticipated in borrow sites and within the permanent area of impact. All disturbed ground not converted to a roadway or structure would be re-seeded with native vegetation.

4.13.15 Noise

Construction of a new roadway, bridges, and culverts would cause temporary noise impacts on surrounding areas during construction activities. These activities may include excavation, fill activities, grading, pile driving, and other related activities.

Alternative A1 would require a two-lane temporary roadway during construction, which would increase noise along the roadway. However, the temporary roadway is adjacent to the existing roadway. The remaining Action Alternatives would be constructed on new alignments; therefore, traffic noise on the existing N-12 roadway would continue as is.

The Study Area primarily consists of pasture/range/grassland with limited development (see Appendix C). The noise-sensitive receivers that are located directly adjacent to the ROW of the Action Alternatives are likely to experience impacts associated with construction activities. The noise impacts resulting from construction include noise generated from machinery required for road and bridge construction. For a discussion of long-term impacts relating to noise, see Appendix C.

4.13.16 Farmland

The permanent conversion of farmland is considered in Appendix C for each of the Action Alternatives. The permanent conversion of farmland would occur within the designated ROW. Temporary impacts on farmland would occur in areas that extend beyond the ROW but are temporarily impacted during construction. The temporarily impacted areas would return to farmland after construction of the alternative is completed.

4.13.17 Regulated Materials

In the event that an unlisted disposal area or contamination is found, materials should be segregated and sampled for hazardous constituents. Title 128 of the Nebraska Administrative Code, Nebraska Hazardous Waste Regulations (Chapter 3), should be followed to determine if the material is a hazardous waste. Additional guidance is provided in the NDEQ Voluntary Cleanup Program (VCP) Investigation-Derived Waste (IDW) protocols.

NDEQ has provided guidance for evaluation of waste: “Waste Determinations [and] Hazardous Waste Testing,” September 2005. The first step of the waste analysis is to evaluate if the waste is excluded from being a hazardous waste by regulation (Nebraska Administrative Code Title 128, Chapter 2, Sections 008 through 013). This requires knowledge of the materials and how they were generated. In general, this step would not be applicable. The second step is to determine if the waste is listed as a hazardous waste in Nebraska Administrative Code Title 128, Chapter 3, Sections 013 through 016. Again, this step requires information on the waste generation and may not be applicable. These two steps would not be applicable because no known hazardous material sites have been identified within the permanent area of impact. The third step is to determine if the waste is characteristic as identified in Nebraska Administrative Code Title 128, Chapter 3, Sections 005 through 010. Characteristic wastes can be any combination of ignitable, corrosive, reactive, or toxic. In lieu of generator knowledge, representative samples of the waste should be collected and analyzed.

Prior to sampling, the disposal facility should be contacted for any additional disposal sampling and analysis requirements. At a minimum, samples should be collected and analyzed to determine the

status (hazardous or non-hazardous) of the waste (Nebraska Administrative Code Title 128, Chapter 3, Sections 013 through 016). Analysis can be completed as either total values or Toxicity Characteristic Leaching Procedure (TCLP). TCLP results can be directly compared to the regulatory criteria. Once received, the results should be provided to the landfill. The landfill should be provided information on whether total or TCLP results are provided.

The last step of the waste determination is to refer to Title 128, Chapters 2, 3, 7, 20 through 22, and 25 for possible exclusions and restrictions pertaining to management of the waste.

Based on the results of the analytical sampling, if the waste material is considered to be a non-hazardous waste, the materials may be disposed in most landfills (Subtitle D). If the waste material is determined to be hazardous or a special waste, an appropriate landfill must be used for disposal (Subtitle C). Not all landfills can accept these materials and wastes may be required to go out of state.

4.13.18 Air Quality

Short-term air quality impacts during construction would occur for the following reasons:

- Construction vehicles and related equipment would increase exhaust emissions.
- Disruption of ground cover by grading and other activities would generate dust.
- Open burning of cleared and grubbed materials would generate smoke emissions.

Emissions from construction vehicles and equipment and activities generating dust are not expected to change the attainment air quality status of the Study Area.

4.13.19 Social

Transportation and Safety

Short-term traffic delays may result from the movement of construction equipment and vehicles to the work sites. A traffic control plan would be developed prior to construction, and details would be finalized during final design of the alignment for Applied-for Project permitted by the Corps. Alternative A1 would be built on the existing roadway while maintaining traffic on a two-lane temporary roadway, which would require crossovers with turning. The remaining Action Alternatives would be new alignments; therefore, traffic could continue on the existing N-12 roadway during construction, although some crossovers would be required at some locations. Crossovers would need to be coordinated for all Action Alternatives into private property access areas and local county roads.

4.13.20 Economics

Businesses and Access

The impact of roadway construction on local businesses is dependent on individual customers' decisions to shop at businesses surrounded by roadway construction. These choices are made based on the availability of substitute products and locations; the convenience of access during construction; the duration of the project; environmental factors such as visibility, dust, and noise; and a range of other factors that can vary among customers.

Most of the businesses are located outside of the Study Area and in Niobrara. Access to and from Niobrara would be maintained at all times during construction, so the businesses in Niobrara would not be impacted.

There are three businesses within the Study Area: Niobrara Outfitters Co., the former Ohiya Casino and Bingo, and Feather Hill Express Gas Station, which have been converted to commercial real-estate. Niobrara Outfitters Co. is a waterfowl hunting operation that leases land north of N-12. Niobrara Outfitters Co. provides hunting and fishing opportunities as well as guide services, a marina, lodging, food service, and permit and licensing services. Due to the type of business that Niobrara Outfitters Co. operates, it is anticipated that the Action Alternatives would not affect this business. The former Ohiya Casino & Bingo and Feather Hill Express gas station were developed by the Santee Sioux Nation and are located 5 miles east of Niobrara, north of N-12.

During construction, Alternative A1 would include a two-lane temporary roadway adjacent to the existing roadway and would not disrupt traffic. Alternatives A2, A3, and A7 would be built on new alignments, so traffic would be maintained on the existing highway during construction. Therefore, access to businesses within the Study Area would not be adversely impacted during construction. As a beneficial impact during construction, construction workers may become customers at local businesses such as restaurants and gas stations in Niobrara and in the Study Area.

4.14 SHORT-TERM USES OF THE ENVIRONMENT VERSUS LONG-TERM PRODUCTIVITY

Balancing the local short-term uses of the human environment with the maintenance and enhancement of long-term productivity (the natural environment) is an important consideration in determining project feasibility. The following identified short- and long-term effects and benefits and losses could be expected under all Action Alternatives.

4.14.1 Short-Term Impacts

Short-term impacts involve any human use of the natural environment. The construction of the roadway would be a short-term effect, causing air emissions, traffic impacts, and noise. Short-term employment and purchases of goods and services generated by the project could create a short-term increase in the local economy that would end once construction is completed.

4.14.2 Long-Term Benefits

All of the Action Alternatives would provide a reliable transportation link on N-12 between Verdel and S-54D that would eliminate existing roadway deficiencies of N-12 within the Study Area. The roadway would be built to current NDOR roadway standards for a major arterial to safely accommodate current and projected traffic levels, with adequate shoulder widths, adequate lane widths, and normal sideslopes. Both motorist safety and vehicle travel times would be improved. Frequency of roadway overtopping would be reduced due to the increased height for the Action Alternatives. The cost to maintain N-12 per year would decrease from an average of \$8,000 per mile to closer to an average cost of \$2,000 per mile.

Long-term productivity of the natural environment for the Action Alternatives would be similar to existing conditions because the area hosts an existing transportation corridor.

4.14.3 Long-Term Losses

Long-term losses attributed to the project are common with the construction of highways. Factors to be considered as long-term losses include:

- Removal of existing farmland within ROW limits from production
- Reduction of the local tax base from conversion of private property to ROW

4.15 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Each Action Alternative would require commitments of natural, physical, human, and financial resources that, for all practical purposes, must be considered to be irreversible and irretrievable. Resource commitments that are considered irreversible and irretrievable are land consumption (including effects on natural resources), energy, and financial resources, as discussed below.

4.15.1 Land Consumption

All Action Alternatives would require the acquisition of undeveloped and developed land for construction of the project. Rangeland or agricultural land, including prime farmland, is the largest potential land use that would be lost. Once property is procured for ROW, there would be little chance that it could be used for agriculture in the foreseeable future.

All Action Alternatives would have direct impacts on the natural land and river system. Woodlands and wetlands would be converted to ROW. Natural features such as trees, geological formations, and fish and wildlife habitat would be lost or modified. Mitigation would partially compensate for features such as wetlands and riparian areas. In addition to direct impacts, there would be some permanent indirect effects on areas not actually acquired for ROW (see Section 4.5, Wetlands and Other Waters of the U.S.; Section 4.6, Floodplains; and Section 4.16, Cumulative Impacts).

4.15.2 Construction and Energy Resources

All Action Alternatives would require fossil fuel and labor as well as construction materials such as steel, cement, aggregate, and bituminous materials. The use of energy, labor, and raw materials is largely irreversible and irretrievable, with the exception of items that can be salvaged during demolition and removal at the end of the facility's design life and possibly recycled. Long-term reduced travel time should result in decreased fossil fuel use.

4.15.3 Financial Resources

A new N-12 roadway would require a federal financial commitment. While these public funds are not directly recoverable, money spent on new infrastructure should be considered a long-term investment in the future safety and economic viability of the region.

4.16 CUMULATIVE IMPACTS

Previous sections of this Draft EIS have focused on evaluating direct impacts (such as filling of a wetland during construction) and indirect impacts (such as increased business traffic in Niobrara during construction) of the alternatives either qualitatively or quantitatively. This section addresses cumulative impacts that could occur as a result of aggregate project impacts and impacts associated with other projects in the Study Area. For example, projects upstream of the proposed new roadway could affect downstream water quality. Cumulative impacts are defined and described for relevant resources.

A cumulative impact is defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time" (40 CFR 1508.7). For a project to be reasonably foreseeable, it must have advanced far enough in the planning process that its implementation is likely. The impacts of reasonably foreseeable future actions not associated with a new N-12 roadway include the impacts of

other federal, state, and private actions. Reasonably foreseeable actions are not speculative, are likely to occur based on reliable sources, and are typically characterized in planning documents.

This assessment of the cumulative impacts for federal, state, and private actions is required by CEQ regulations developed from NEPA. Cumulative impacts were evaluated in accordance with CEQ guidance (CEQ 1997). In Regulatory Guidance Letter 84-09, the Corps state that the geographic size of the area (for example, watershed or other readily identifiable geographic area) in which cumulative impacts are to be considered must be established. Within the geographic area, a description of historical permitting activities should be developed, along with anticipated future activities in the area, to provide a rate of development. In addition, any regional or local land use plans or management plans, if any exist should be described in context of the proposed work (Corps 1984).

4.16.1 Project-Specific Cumulative Impacts to Be Analyzed

Determining cumulative environmental consequences requires delineating the cause-and-effect relationships between the multiple actions and the resources, ecosystems, and human communities of concern. One of the first steps is to identify the major cumulative effects issues for the project and which resources are important from a cumulative effects perspective. The major cumulative impact issues associated with the project were determined to be:

- Impacts on jurisdictional wetlands and waters of the U.S.
- Potential to affect federally listed interior least tern, whooping crane, ABB, and northern long-eared bat
- Potential to affect state-listed sturgeon chub and North American river otter
- Impacts on visual resources
- Impacts on acquisitions and relocations

Impacts on wetlands and waters of the U.S. would not only occur under this project, but also under other projects within and in the vicinity of the Study Area. For the purposes of this analysis the geographic study area of analysis for cumulative effects includes the Study Area, areas directly adjacent to the Study Area, and the Missouri River to the Lake RM 811 (Gavins Point Dam). Past, present, and reasonably foreseeable future projects are listed below for the purposes of identifying potential cumulative effects.

The potential to affect, but not likely adversely affect the interior least tern, whooping crane, ABB, and northern long-eared bat, were determined to occur for this project. For cumulative effects analysis relative these species, past, present, and foreseeable federal, state, or private activities that occurred within the Study Area were identified for the purposes of identifying potential cumulative effects.

For the purposes of determining cumulative effects under Section 7 of the ESA, future federal actions are not considered within the category of cumulative effects. This is because they require separate consultations under Section 7 of the ESA, after which they are considered part of the environmental baseline for future Section 7 of the ESA consultations. However, future federal projects are listed here to identify future activities that may affect the interior least tern, whooping crane, ABB, and northern long-eared bat. While state-listed species, such as sturgeon chub and North American river otter are not subject to Section 7 of the ESA, a similar analysis was performed.

Impacts on visual resources would occur predominately on Alternative A1 and A2. One key observation point would have a moderate effect under Alternative A3 and A7. The geographic area of analysis includes the 39-Mile District of the MNRR.

Impacts on acquisitions and relocations include areas within the Missouri River floodplain in Knox County.

The other resources analyzed in previous sections as well as those discussed in Appendix C were determined to have no, negligible, or minor adverse impacts. A number of comments received during public scoping involved sediment removal from the Missouri River. None of the Action Alternatives would affect existing sediment levels. Public scoping comments addressed concern with a road in the bluffs related to stability and business impacts. The alternatives in the bluffs were determined to not be reasonable and were not carried forward for analysis. Therefore, the other resources in this section and in Appendix C were not identified as national, regional, or local issues of importance and are not assessed for cumulative impacts.

4.16.2 Geographic and Time Frame Scope of Analysis

Prior to assessing cumulative impacts, the Corps determined the scope of the reviewed actions on a geographic and time frame scale. The geographic scope of analysis is as follows:

- Wetlands and waters of the U.S. – Wetlands and waters of the U.S. were considered on the scale of the HUC 8 watersheds that the Study Area overlapped: Dewey Creek – Ponca Creek, Harry Miller Creek – Missouri River, Burgess Creek – Niobrara River, City of Niobrara – Missouri River, and Outlet Bazile Creek.
- Interior least tern, whooping crane, ABB, and northern long-eared bat – Federally listed species were considered on the scale of the NGPC-designated ranges.
- Sturgeon chub and North American river otter – State-listed species were considered on the scale of NGPC-designated ranges.
- Visual – Visual impacts were considered for the 39-Mile District of the MNRR.
- Acquisitions and relocations – Acquisitions and relocations were considered within the Missouri River floodplain in Knox County.

The time frame scope of analysis considered for the cumulative analysis is begins in 1955, the year of the Gavins Point Dam closure, which subsequently caused the deposition of silt at the delta of the Missouri and Niobrara rivers and the rise in groundwater in the N-12 Study Area. Year 2045, the year used to establish the Missouri River elevations, given ice conditions and sediment loads, used to establish necessary roadway elevations for roadway design, was used as the end year of analysis.

4.16.3 Past, Present, and Reasonably Foreseeable Future Projects

The following projects represent past and present reasonably foreseeable projects in the Study Area; no specific future projects were identified.

- Mainstem System – As described in Chapter 1.0, the Mainstem System, made up of six major flood control dams constructed on the Missouri River during the 1950s and 1960s, is a project that has altered the landscape of the entire Missouri River valley, including the Study Area. The past effects of Mainstem System construction dwarf the cumulative effects of the project and the reasonably foreseeable future actions because of the magnitude of the past actions. The effects of this past action are reflected in the existing environment. The Mainstem System is regulated by the Corps using guidelines published in the Master Manual to serve the Congressionally authorized project purposes of flood control, navigation, irrigation, hydropower generation, water supply, water quality control, recreation, and fish and wildlife (including T&E species). Overall, the Mainstem System has altered the natural hydrograph,

caused the loss of floodplain habitat, caused the loss of sediment transport thus increasing erosion rates, and altered water temperature with cold temperature water releases from dams. Indirectly, management of the Mainstem System, in addition to other factors, has led to increased construction of stream bank stabilization and declines in water quality and also puts in jeopardy the existence of T&E species, including the pallid sturgeon, interior least tern, and piping plover (NPS 2005). Some portions of the Mainstem System, particularly tail water areas of reservoirs, have seen a conversion from riparian and riverine floodplain habitat to open water and marsh areas.

- Corps-permitted bank stabilizations – The Corps has permitted five Corps and 29 non-Corps bank stabilization projects between the Fort Randall Dam and the Lake from 1978 to 2011. The five Corps projects range in size from 150 to 700 feet in length. The non-Corps projects range in size from 4,400 to 22,000 feet in length. Total wetland impacts for these projects were 1.38 acres. These bank stabilization projects may protect wildlife habitat, farmland, cabins, boat ramps, and infrastructure, such as roadways or wells. However, bank stabilization can affect channel migration, as well as the integrity for which the MNRR was designated as part of the National Wild and Scenic Rivers System. In cooperation with NPS under Section 7 (a) of the Wild and Scenic Rivers Act, future bank stabilization projects may be considered for permitting purposes; however, none have been identified.
- Master Manual – This document guides the operation of the Corps' Missouri River mainstem dams and reservoirs, and document describes the basic water control plan and objectives of the integrated operation of the mainstem reservoirs. The Master Manual, Final EIS, which identifies a preferred alternative, was published in March 2004. A ROD was signed on March 19, 2004, implementing the preferred alternative identified in the Final EIS as modified in the ROD.
- Chief Standing Bear Memorial Bridge – From 1996 to 1998, NDOR constructed a new Missouri River bridge between Nebraska and South Dakota east of Niobrara to connect N-12 and N-14 to SD-37, replacing the old ferry crossing.
- Missouri River Recovery Program – This program is a partnership among the Corps, USFWS, Tribal nations, states, and other agencies to develop and implement recovery actions on the Missouri River in response to the USFWS's 2000 Biological Opinion, amended in 2003 (USFWS 2003b). While no specific future projects have been identified; however, this program includes several activities, as described below:
 - Cottonwood Management Plan – The purpose of this plan is to guide management actions along the Missouri River to protect and restore cottonwood forests in six priority river segments. Two of those segments, Segment 8 Fort Randall Dam to Niobrara River and Segment 9 Niobrara River to Lewis and Clark Lake Delta, are in the vicinity of the project. The Corps released its Cottonwood Management Plan in February 2010 (Corps 2010).
 - ESH Program – This program builds sandbars for species such as the interior least tern and piping plover through mechanically building new areas or clearing existing sandbars. The ESH Program created 137 acres of nesting habitat for interior least terns and piping plovers in 2008 and 2009 between the Niobrara River and Missouri River confluence and the Lake (Segment 9) (Corps 2010). However, record discharges in the Mainstem System during 2011 led to the formation of sandbars and in 2012, the ESH Program focused more on maintaining those naturally created sandbars (Corps 2014b).

- Shallow Water Habitat Program – This program creates shallow water habitat through channel widening and the restoration of chutes and side channels. However, this program only applies to the river below Gavins Point Dam (Corps 2013).
- Flow Modification – The Corps added March and May spring pulses from Gavins Point Dam in the Master Manual. These pulses attempt to mimic the much larger, historic spring rises on the Missouri River. However, the flow modifications are only occurring at Fort Peck Dam with monitoring below Gavins Point Dam (Corps 2014c)

The Missouri River Recovery Management Plan and EIS would evaluate the effectiveness of habitat development and recommend any modifications to avoid jeopardy to the species. This effort is planned for completion in summer 2016.

- Temporary grade raise to the N-12 and N-14 intersection in Niobrara – The intersection of N-12 and N-14 was temporarily raised in June 2011. Approximately 0.003 acre of wetlands was impacted during the grade raise.
- Improvements to N-12 following the 2011 flood – The repairs to N-12 occurred in two phases. Phase 1 included returning the roadway to pre-flood conditions. Phase 2 occurred from Verdel to the Santee Spur and involved widening the shoulders. The roadway work impacted approximately 5 acres of wetlands. Mitigation to offset these wetland impacts has been identified within the context of a mitigation plan developed by NDOR, vetted by the Corps and NPS, and would be implemented as a permit condition prior to or concurrently with implementation of mitigation associated with the Applied-for Project.

4.16.4 Cumulative Impacts on Wetlands and Other Waters of the U.S.

The construction of the Mainstem System and the operation of the Mainstem System under the Corps' Master Manual (Corps 2006) have had the greatest impact on the wetlands and waters of the U.S. within the vicinity of the Study Area. Riverine and riparian wetlands were lost due to the construction of the Mainstem System and the resultant reservoir pools. Tributaries to the Missouri River were impacted by reservoir pools.

However, the majority of wetlands being impacted by the Action Alternatives are similar in type to those being created in the tailwaters of the Lake with the Study Area. As discussed in Chapter 1.0, a combination of 1) the silt load deposited into the Lake from the Missouri River and its tributaries (primarily the Niobrara River and Bazile Creek) that causes the Lake to increase in size and the water levels to rise; and 2) the operation of Fort Randall Dam (releases of high flows during the navigation season) have affected the wetland trends in the vicinity of the project. In a recent reconnaissance assessment completed by the Corps (Corps 2011e), it was estimated that the sedimentation in the Lake, and the associated trend of delta growth, has created approximately 11,500 acres of wetlands (Corps 2011e). It should be noted that the 11,500 acres includes between 10 and 20 percent of open water. This vast expanse of wetlands began formation in 1955 with the construction of Gavins Point Dam and it is estimated that, on average, between 190 and 210 acres of wetland are created per year as a result of deposition into the Lake (Corps 2011e).

Construction of Corps approved bank stabilizations and construction of Chief Standing Bear Memorial Bridge also had wetland impacts. These projects required Section 404 permit authorizations, and as such, wetland impacts were mitigated. The Missouri River Recovery Program, and specifically the ESH Program, also impacts wetlands. While some of these projects have been near the Study Area, they are also authorized by the Corps and are intended to aid in the recovery of interior least terns and piping plovers.

The past projects of the grade raise to N-12 and N-14 intersection and N-12 rehabilitation as a result of the 2011 Missouri River flooding impacted approximately 5 acres of wetlands. These projects required a Section 404 permit authorization as well as wetland mitigation.

None of these projects are anticipated to impact stream channels of tributaries to the Missouri River within the geographic study area.

Cumulative Impacts Associated with the No-Action Alternative

The No-Action Alternative would not affect wetlands or other waters of the U.S. because the road would not be constructed and the wetlands, waterways, and other waters of the U.S. would not be affected. Reasonably foreseeable future road improvement projects would need to occur along N-12 as siltation continues and flooding of the roadway would persist. These future road improvement projects may impact existing wetlands and other waters of the U.S. Wetlands would likely continue to develop and expand in the floodplains due to sediment deposition and rising groundwater levels in the area. This alternative, in combination with past, present, and reasonably foreseeable future projects would not have cumulative effect on wetlands and other waters of the U.S.

Cumulative Impacts Associated with the Action Alternatives

The Action Alternatives each would impact wetlands and waters of the U.S. at slightly different levels (see Section 4.5, Wetlands and Other Waters of the U.S.). However, when considering the availability of the resource within the geographic study area, the amount of impact is relatively small. When considering that there are 6,100 acres of wetlands present within the Missouri River delta area (Corps 2010), the percent of wetland impact of the Action Alternatives on this resource would be minor. In addition, wetland resources are increasing within the Missouri River floodplain. Therefore, adverse cumulative effects on wetlands would not occur as a result of the Action Alternatives combined with other projects previously identified given the amount of this resource within the geographic study area.

As no other past, present, or reasonably foreseeable project is anticipated to impact streams or tributaries to the Missouri River, adverse cumulative effects on other waters of the U.S. would not occur as a result of the Action Alternatives combined with other projects previously identified.

4.16.5 Cumulative Impacts on Interior Least Tern

The construction of the Mainstem System and the operation of the Mainstem System under the Corps' Master Manual (Corps 2006) may have had the greatest impact on the interior least tern habitat within the geographic study area. Construction of the reservoirs and alterations of the annual hydrograph affect interior least tern habitat through reducing sandbar habitat.

The past projects of the grade raise to N-12 and N-14 intersection and N-12 rehabilitation as a result of the 2011 Missouri River flooding resulted in wetland impacts but were not anticipated to affect sandbar habitat. All future and past projects (other than the Mainstem System) required Section 7 of the ESA consultation and are considered as part of the baseline for analysis of the Section 7 of the ESA consultation for the project.

Cumulative Impacts Associated with the No-Action Alternative

Under the No-Action Alternative, improvements to N-12 would not be constructed. Continued roadway maintenance would primarily occur within existing ROW and would not be expected to adversely affect potential interior least tern habitat.

Cumulative Impacts Associated with the Action Alternatives

Although interior least terns may use the Missouri River corridor and the Niobrara River during migration and breeding seasons, the Missouri River wetlands in the Action Area, while connected to the river hydrologically, do not contain suitable breeding or nesting habitat for this species. In addition, as part of the Missouri River Recovery Program, the ESH Program is ongoing with the goal to create sandbar nesting areas for interior least terns within the geographic study area.

Impacts on interior least terns associated with the Action Alternatives are related to the potential to impact wetland areas used for interior least tern forage habitat. Impacts on wetlands within the geographic study area are negligible. Interior least terns may forage long distances from their nests for minnows and other small fish, the amount of impact is considered insignificant and discountable.

Based on the no impact on interior least tern breeding areas, the existence of the ESH Program to increase breeding habitat, and negligible impacts on forage habitat, adverse cumulative effects on interior least terns would not occur as a result of the Action Alternatives combined with other projects previously identified.

4.16.6 Cumulative Impacts on Whooping Crane

The construction of the Mainstem System and the operation of the Mainstem System under the Corps' Master Manual (Corps 2006) may have had the greatest impact on the whooping crane habitat within the geographic study area. It is uncertain if conditions prior to the Mainstem System, with no regulation of flows or reservoirs, provided less or more potential habitat than the existing conditions, with larger expanses of wetlands and marsh areas within the reservoirs.

Construction of Corps approved bank stabilizations and construction of Chief Standing Bear Memorial Bridge also had wetland impacts, and consequently, potential impact on whooping crane forage habitat. The Missouri River Recovery Program, and specifically the Shallow Water Habitat creates whooping crane habitat.

The past projects of the grade raise to N-12 and N-14 intersection and N-12 rehabilitation as a result of the 2011 Missouri River flooding resulted in wetland impacts. All future and past projects (other than the Mainstem System) required Section 7 of the ESA consultation and are considered as part of the baseline for analysis of the Section 7 of the ESA consultation for the project.

Cumulative Impacts Associated with the No-Action Alternative

Under the No-Action Alternative, improvements to N-12 would not be constructed. Continued roadway maintenance would primarily occur within existing ROW and would not be expected to adversely affect potential whooping crane habitat.

Cumulative Impacts Associated with the Action Alternatives

Whooping cranes may use the Missouri River corridor, associated tributaries, and the Niobrara River during migration; however, the Study Area is located on the eastern edge of the main flyway used by this species. The Action Alternatives would impact approximately 32 to 89 acres of wetlands and open waters. Such impacts could indirectly affect whooping cranes, which may forage in these areas; however, this slight amount of impact is not likely to adversely affect this species because these impacts would occur to less than 1 percent of the total wetland habitat within the Study Area and downstream to the Lake delta. Thousands of acres of additional foraging habitat are available within the whooping crane's range.

As part of the Missouri River Recovery Program, a Shallow Water Habitat Program is ongoing with the goal to create shallow water habitat through channel widening and the restoration of chutes and side channels. This project would create habitat for whooping crane forage and nesting.

Based on the rarity of sightings in the Study Area and relative location of the Study Area to the flyway, the abundance of available habitat, and projects to improve this habitat, adverse cumulative effects on whooping crane habitat would not occur as a result of the Action Alternatives combined with other projects identified above.

4.16.7 Cumulative Impacts on American Burying Beetle

The construction of the Mainstem System may have had the greatest impact on ABB habitat in the geographic study area. Although the ABB uses a variety of habitats, the north-central Sandhills population of ABB appears to prefer grassland prairie; forest edge; open woodlands with grasslands; and mesic areas, such as wet meadows, streams, and wetlands in association with relatively undisturbed semi-arid sandhill and loam grasslands. These types of areas were converted to deep water habitat when the dams were closed and the reservoirs were filled. The ABB would likely not be found in the deeper water wetland habitats located within or directly adjacent to the Missouri River floodplain because it has never been described as occurring in deeper water wetland habitats in the literature (USFWS 2008).

Construction of Corps approved bank stabilizations may have impacted some ABB habitat as these areas were constructed in a combination of upland and wetland and deep water areas directly adjacent to the Missouri river. Construction of Chief Standing Bear Memorial Bridge likely had minimal impact on ABB habitat due the majority of this construction taking place within wetlands and deeper water habitats.

The past grade raise to N-12 and N-14 intersection occurred in upland areas and may have affected potential ABB habitat. Construction of N-12 rehabilitation as a result of the 2011 Missouri River flooding was not anticipated to effect potential ABB habitat because impacts occurred within wetlands and deeper water habitats adjacent to the Missouri River.

All future and past projects (other than the Mainstem System) required Section 7 of the ESA consultation and are considered as part of the baseline for analysis of the Section 7 of the ESA consultation for the project.

Cumulative Impacts Associated with the No-Action Alternative

Under the No-Action Alternative, improvements to N-12 would not be constructed. Continued roadway maintenance would primarily occur within existing ROW and would not be expected to adversely affect potential ABB habitat.

Cumulative Impacts Associated with the Action Alternatives

The Action Alternatives within the floodplain (A1, A2, A3, and A7), when compared to the total acres of potential ABB habitat within the Study Area, are affecting less than 5 percent of all available potential habitat. Other past, present, and reasonably foreseeable projects with the geographic study area are not anticipated to impact areas that would be typical ABB habitat.

Because of the small amount of ABB habitat impact by the Action Alternatives combined with limited potential to impact ABB habitat by other present or reasonably foreseeable future projects, adverse cumulative effects on ABB habitat would not occur as a result of the Action Alternatives combined with other projects previously identified.

4.16.8 Cumulative Impacts on the Northern Long-Eared Bat

The construction of the Mainstem System may have had the greatest impact on northern long-eared bat habitat in the geographic study area. The northern long-eared bat prefers to roost underneath bark, in cavities or in crevices of both live trees and snags. Trees associated with the Missouri River riparian areas were converted to deep water habitat when the dams were closed and the reservoirs were filled. The flood in 2011 may have increased bat habitat because many trees died after standing in water for months. However, as those trees decompose and completely fall down, bats would not be able to use them.

Construction of Corps approved bank stabilizations may have impacted some northern long-eared bat habitat because these areas may have included tree removal adjacent to the Missouri river. Construction of Chief Standing Bear Memorial Bridge likely removed trees as well.

The past grade raise to N-12 and N-14 intersection did not cause any removal of woodland habitat. Construction of N-12 rehabilitation as a result of the 2011 Missouri River flooding was not anticipated to affect potential northern long-eared bat habitat because no trees were removed.

All future and past projects (other than the Mainstem System) require Section 7 of the ESA consultation and are considered as part of the baseline for analysis of the Section 7 of the ESA consultation for the project.

Cumulative Impacts Associated with the No-Action Alternative

Under the No-Action Alternative, improvements to N-12 would not be constructed. Continued roadway maintenance would primarily occur within existing ROW and would not be expected to adversely affect potential northern long-eared bat habitat.

Cumulative Impacts Associated with the Action Alternatives

The Action Alternatives within the floodplain (A1, A2, A3, and A7), when compared to the total acres of potential northern long-eared bat habitat within the Study Area, all have a negligible impact. Other past, present, and reasonably foreseeable projects with the geographic study area are not anticipated to impact areas that would be typical northern long-eared bat habitat.

Because of the negligible to minor amount of northern long-eared bat habitat affected by the Action Alternatives combined with limited potential to impact woodland habitat by other present or reasonably foreseeable future projects, adverse cumulative effects on northern long-eared bat habitat would not occur as a result of the Action Alternatives combined with other projects previously identified.

4.16.9 Cumulative Impacts on the Sturgeon Chub and North American River Otter

The construction of the Mainstem System may have had the greatest impact on sturgeon chub and North American river otter habitat in the geographic study area. The sturgeon chub prefers the main channel of the Missouri River, but could use floodplain wetlands during transient or migratory periods. The North American river otter prefers the Niobrara River upstream of its confluence with the Missouri River but could use the floodplain and Missouri River tributaries because the species is highly mobile. When the dams were closed and the reservoirs were filled, there was a change to the hydrography of the Missouri River and its tributaries.

Construction of Corps approved bank stabilizations may have impacted some sturgeon chub and North American river otter habitat when revetment was placed along banks and below the water line.

Cumulative Impacts Associated with the No-Action Alternative

Under the No-Action Alternative, improvements to N-12 would not be constructed. Continued roadway maintenance would primarily occur within existing ROW and would not be expected to adversely affect potential sturgeon chub or North American river otter habitat.

Cumulative Impacts Associated with the Action Alternatives

The Action Alternatives (A1, A2, A3, and A7) would not have a direct impact on the Missouri or Niobrara rivers. There would be stream impacts on the other Missouri River tributaries in the Study Area. Other past, present, and reasonably foreseeable projects with the geographic study area are not anticipated to impact areas that would be typical sturgeon chub or North American river otter habitat.

Because of the negligible to minor amount of sturgeon chub or North American river otter habitat affected by the Action Alternatives combined with limited potential to impact floodplain habitat by other present or reasonably foreseeable future projects, adverse cumulative effects on sturgeon chub or North American river otter habitat would not occur as a result of the Action Alternatives combined with other projects previously identified.

4.16.10 Cumulative Impacts on Visual

The 39-Mile District was established after the construction of the Mainstem System. All federal projects occurring within the 39-Mile District require approval from NPS under the Wild and Scenic Rivers Act.

Cumulative Impacts Associated with the No-Action Alternative

Under the No-Action Alternative, improvements to N-12 would not be constructed. Continued roadway maintenance would primarily occur within existing ROW and would not be expected to adversely affect visual resources.

Cumulative Impacts Associated with the Action Alternatives

No other non-federal projects are identified within the 39-Mile District. Because no past, present, or reasonably foreseeable future projects have been identified that have an impact on visual resources, adverse cumulative effects on visual resources would not occur as a result of the Action Alternatives.

4.16.11 Cumulative Impacts on Acquisitions and Relocations

The construction of the Gavins Point Dam as part of the Mainstem System resulted in the creation of the 25-mile-long Lake that encompasses a total of approximately 31,000 acres. Nearly half of the Lake is within Knox County, a small portion in Cedar County, and the rest within the state of South Dakota. The Corps acquired land and relocated residences for the dam and Lake. No future acquisitions are planned for the Mainstem System (flowage easements are not an acquisition because land ownership does not change). Other past, present, and reasonably foreseeable future projects required minimal or no acquisition of land, by comparison.

Cumulative Impacts Associated with the No-Action Alternative

Under the No-Action Alternative, improvements to N-12 would not be constructed. No new acquisition of ROW would be needed and there would be no effect on acquisitions and relocations.

Cumulative Impacts Associated with the Action Alternatives

None of the Action Alternatives would require relocations. Therefore, no cumulative effects would occur as a result of the Action Alternatives combined with other projects previously identified.

With respect to acquisitions, the Actions Alternatives require the need to obtain new ROW and, in the case of Alternatives A3 and A7, the potential acquisition of parcels that could not be accessed feasibly. With the exceptions of Bazile Creek WMA, Ponca State Park, and the Lake State Recreation Area, the majority of the Missouri River floodplain is privately owned (approximately 8,500 acres). Therefore, even though the completion of the Mainstem System resulted in acquisitions, and the Action Alternatives would require acquisitions, these amounts, cumulatively, would be minor.

4.17 SUMMARY OF ENVIRONMENTAL CONSEQUENCES

Table 4-13 provides a summary of impacts resulting from each alternative for the resources evaluated in detail.

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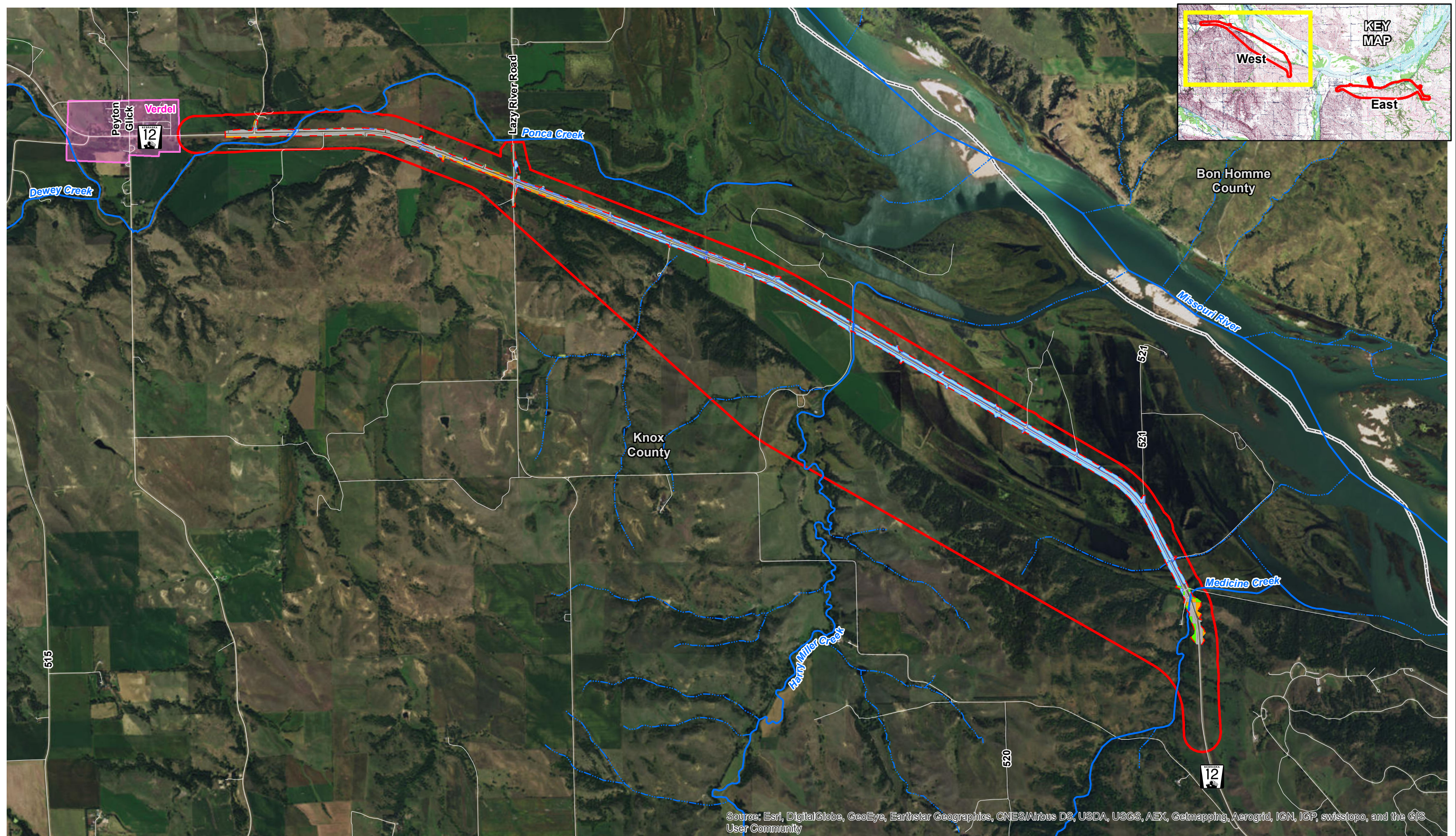
Table 4-13
Summary of Potential Impacts

Resource or Issue	No-Action Alternative	Alternative A1	Alternative A2	Alternative A3	Alternative A7 (Applied-for Project)
Wild and Scenic Rivers	No impact	Not evaluated	Not evaluated	Not evaluated	Analysis is on Applied-for Project (see Appendix A)
Fish and Wildlife	Negligible impact on fish and wildlife resulting from any road maintenance repairs	Negligible impact on fish habitat and water quality; negligible impact on agriculture, woodlands, grassland and rangeland, and wetlands Agricultural Impacts: 2 acres Woodland Impacts: 8 acres Grass/Rangeland: 14 acres Wetland: 147.4 acres	Negligible impact on fish habitat and water quality; negligible impact on agriculture, woodlands, grassland/ rangeland, and wetlands Agricultural Impacts: 6 acres Woodland Impacts: 14 acres Grass/Rangeland: 21 acres Wetland: 142.3 acres	Negligible impact on fish habitat and water quality; negligible impact on woodlands, grassland/ rangeland, and wetlands; Minor impact on agriculture Agricultural Impacts: 23 acres Woodland Impacts: 67 acres Grass/Rangeland: 56 acres Wetland: 122.3 acres	Negligible impact on fish habitat and water quality; negligible impact on woodlands, grassland/ rangeland, and wetlands; Minor impact on agriculture Agricultural Impacts: 23 acres Woodland Impacts: 67 acres Grass/Rangeland: 56 acres Wetland: 90.9 acres
Protected Species ¹	No effect	Not likely to adversely affect sturgeon chub, North American river otter, interior least tern, whooping crane, American burying beetle, Northern long-eared bat; no effect on all other listed species	Not likely to adversely affect sturgeon chub, North American river otter, interior least tern, whooping crane, American burying beetle, Northern long-eared bat; no effect on all other listed species	Not likely to adversely affect sturgeon chub, North American river otter, interior least tern, whooping crane, American burying beetle, Northern long-eared bat; no effect on all other listed species	Not likely to adversely affect sturgeon chub, North American river otter, interior least tern, whooping crane, American burying beetle, Northern long-eared bat; no effect on all other listed species
Water Quality	No impact	Negligible impact on surface water and groundwater	Negligible impact on surface water and groundwater	Negligible impact on surface water and groundwater	Negligible impact on surface water and groundwater
Wetlands and Waters of the U.S.	No impact	Major impact on wetlands and waters of the U.S. Wetland: 147.4 acres Stream impact: 1,969 feet	Major impact on wetlands and waters of the U.S. Wetland: 142.3 acres Stream impact: 2,741 feet	Major impact on wetlands and waters of the U.S. Wetland: 122.3 acres Stream impact: 2,763 feet	Major impact on wetlands and waters of the U.S. Wetland: 90.9 acres Stream impact: 2,763 feet
Floodplains	Negligible impact on Missouri River conveyance, floodplain storage, and Lewis and Clark Lake storage	Negligible impact on Missouri River conveyance; major negative impact on floodplain storage and Lewis and Clark Lake storage	Negligible impact on Missouri River conveyance; major negative impact on floodplain storage and Lewis and Clark Lake storage	Negligible impact on Missouri River conveyance, floodplain storage, and Lewis and Clark Lake storage	Negligible impact on Missouri River conveyance, floodplain storage, and Lewis and Clark Lake storage
Visual	Negligible impact	Negligible to major impact	Negligible to major impact	Negligible to moderate impact	Negligible to moderate impact
Cultural Resources	No impact	No impact on known cultural resources	No impact on known cultural resources	No impact on known cultural resources	No impact on known cultural resources
Recreation	Negative impact on visitor access due to unreliable roadway	Negligible impact on Bazile Creek Wildlife Management Area (WMA)	Negligible impact on Bazile Creek WMA	Negligible impact on Bazile Creek WMA	Negligible impact on Bazile Creek WMA
Pedestrians, Bicyclists, and Canoeists	Adversely impact bicyclists' use of Nebraska Highway 12 (N-12)	Shoofly would cause a temporary minor disruption to bicyclists	Minor beneficial impact on bicyclists use of N-12 due to increased shoulder width	Minor beneficial impact on bicyclists use of N-12 due to increased shoulder width	Minor beneficial impact on bicyclists use of N-12 due to increased shoulder width
Acquisitions and Relocations	No impact	Major impact on right-of-way (ROW); no relocations required	Major impact on ROW; no relocations required	Major impact on ROW; no relocations required	Major impact on ROW; no relocations required

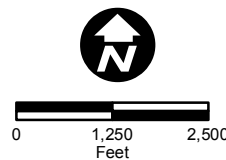
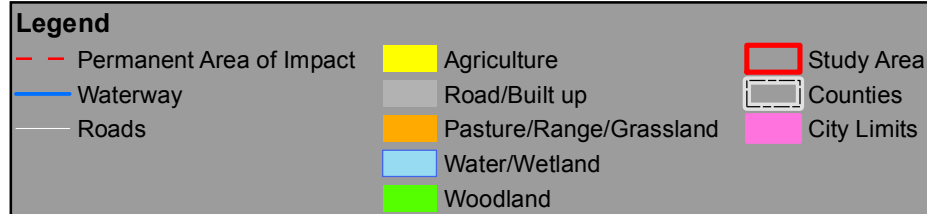
Note:
¹ Section 7 of the Endangered Species Act does not apply to state-listed species, but the same affect determination language was used for state-listed species.

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Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

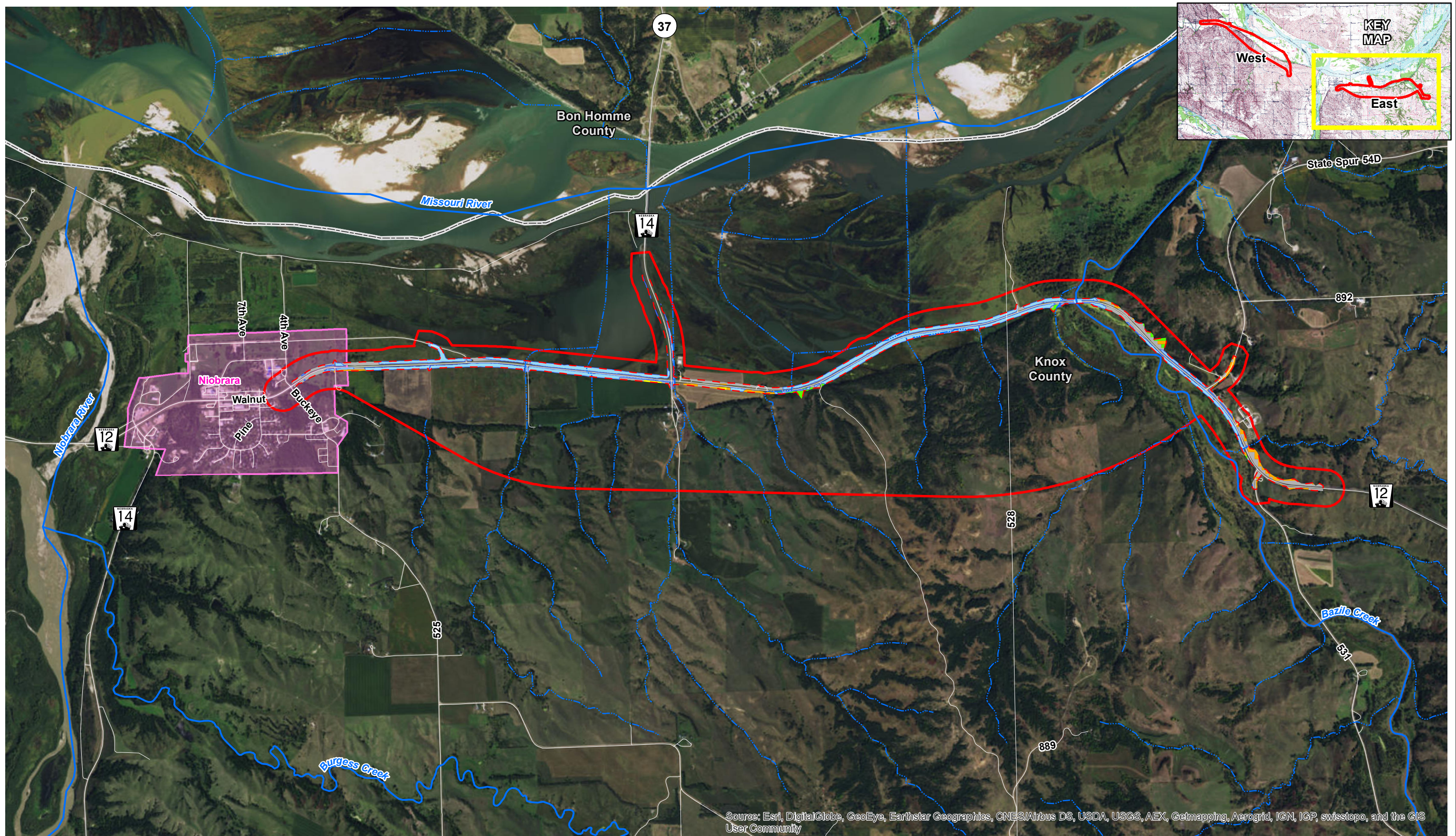


Alternative A1 Natural Environment
West Segment
N-12 Niobrara East and West
Knox County, Nebraska
Environmental Impact Statement

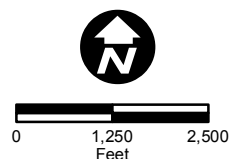
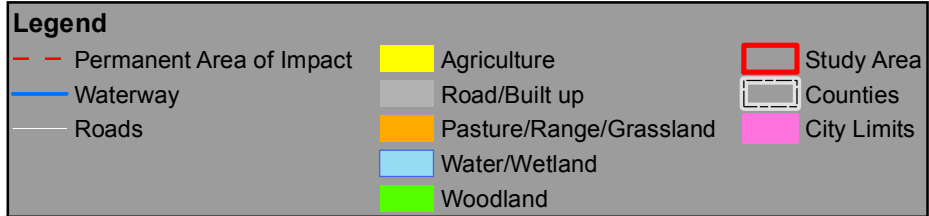


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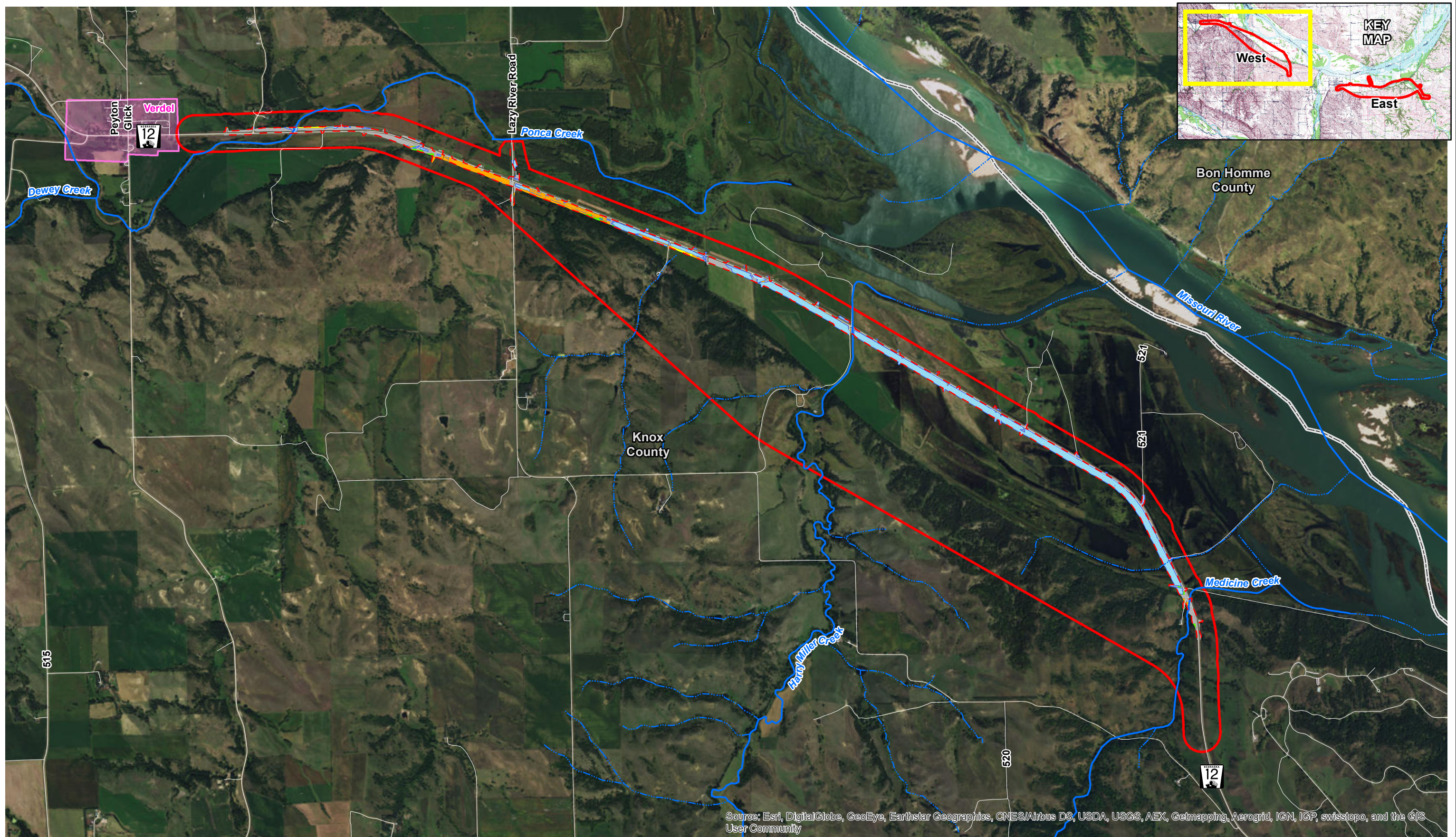
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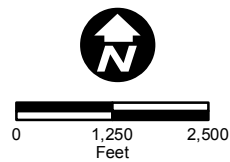
Alternative A1 Natural Environment
East Segment
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FIGURE	4-1b

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Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

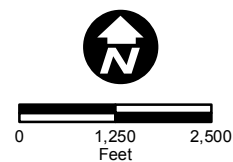
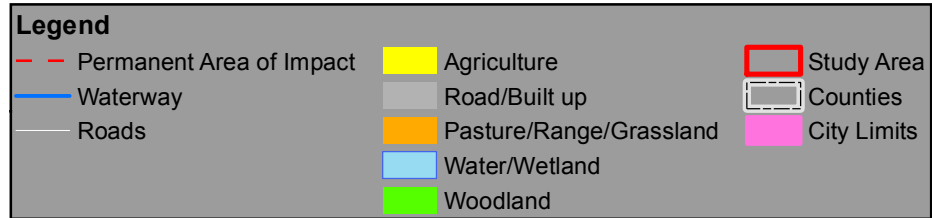
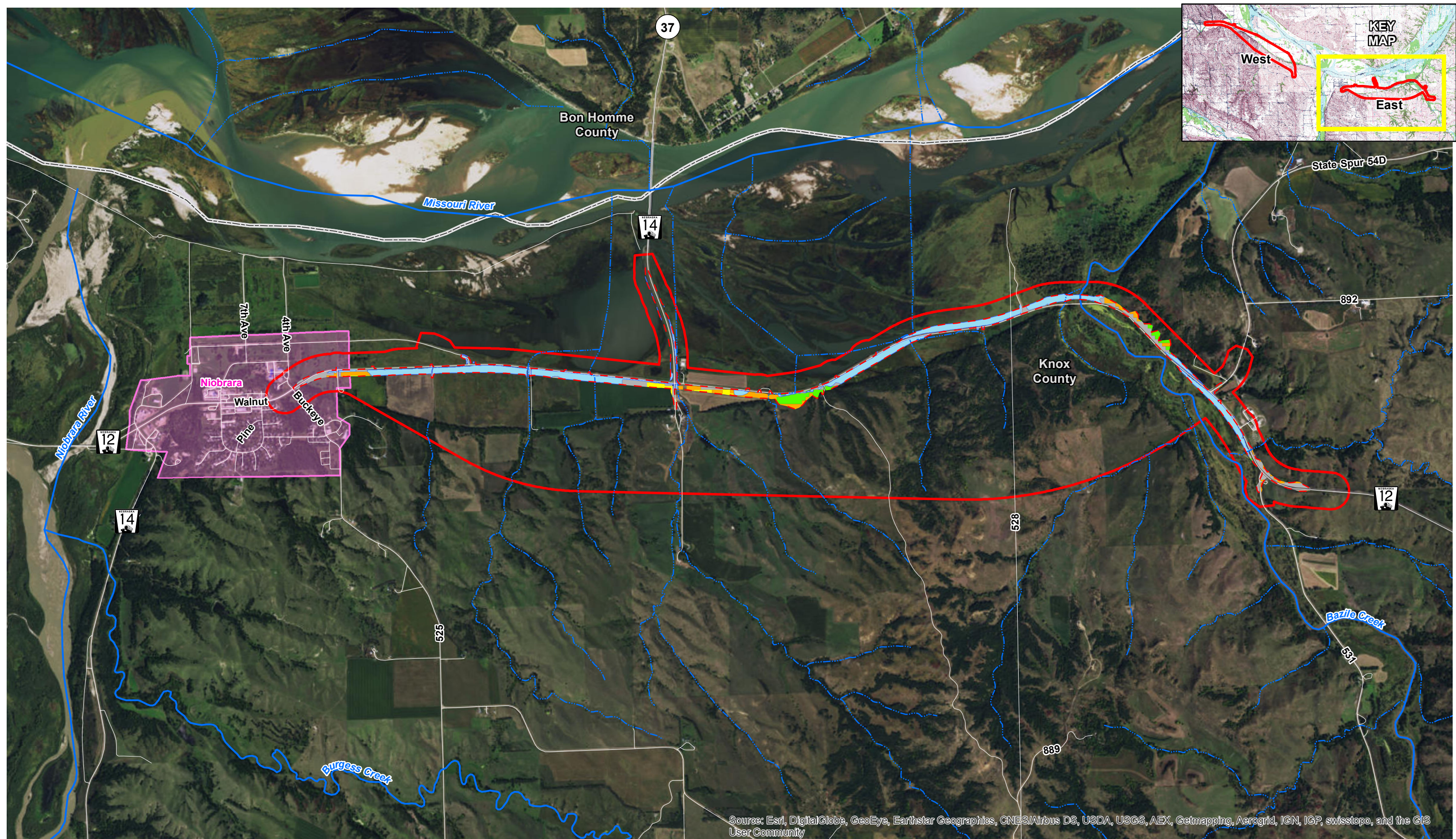


Alternative A2 Natural Environment
West Segment
N-12 Niobrara East and West
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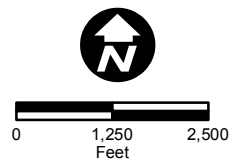
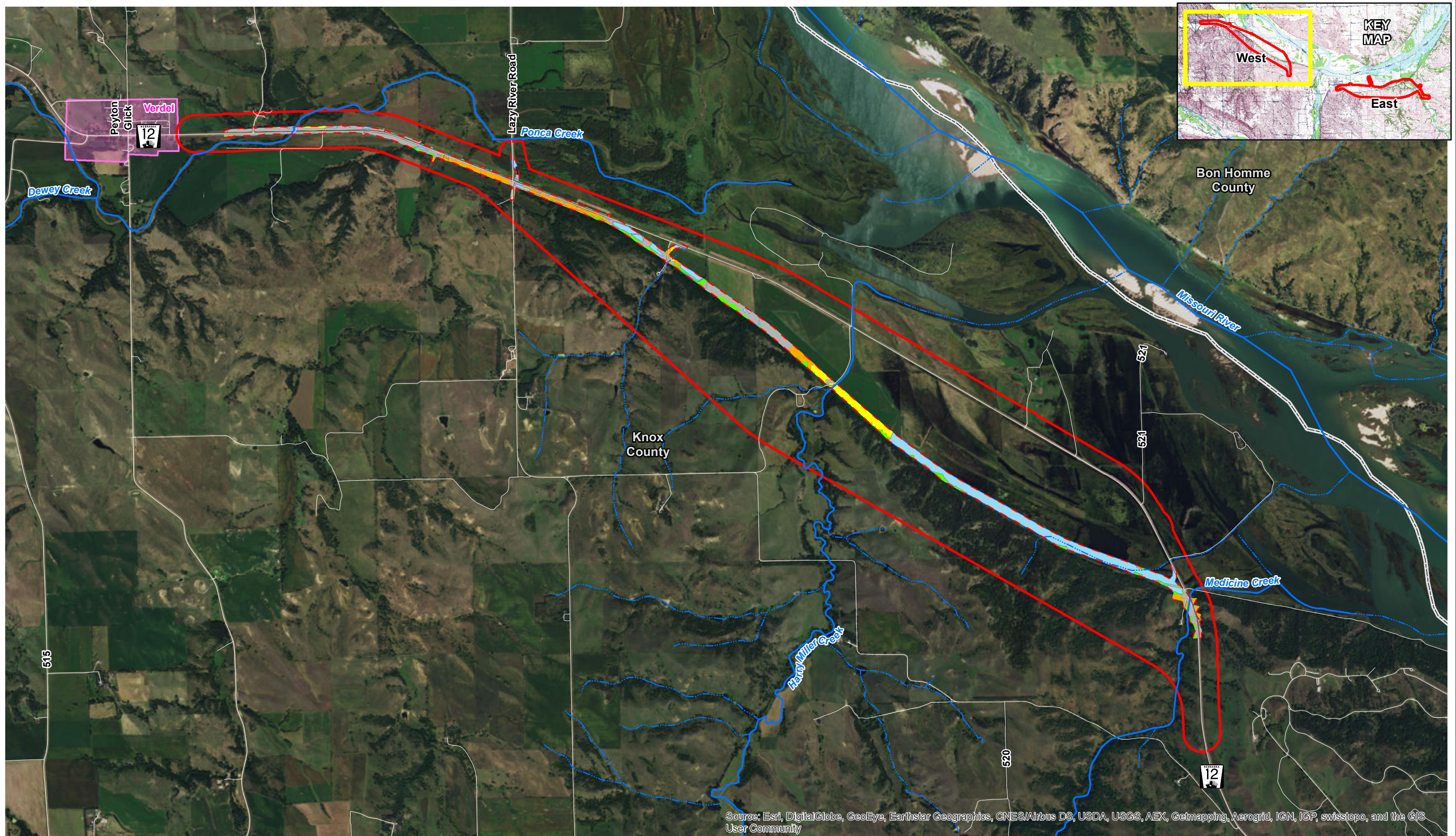
Alternative A2 Natural Environment
East Segment
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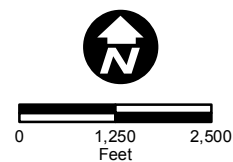
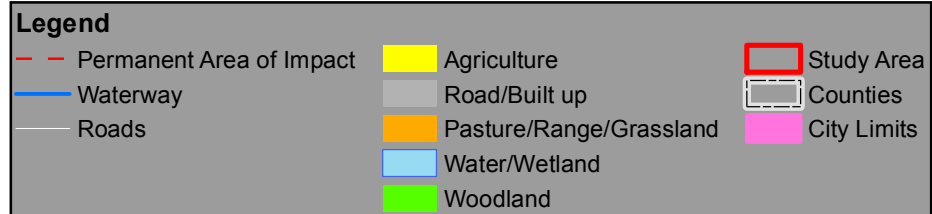
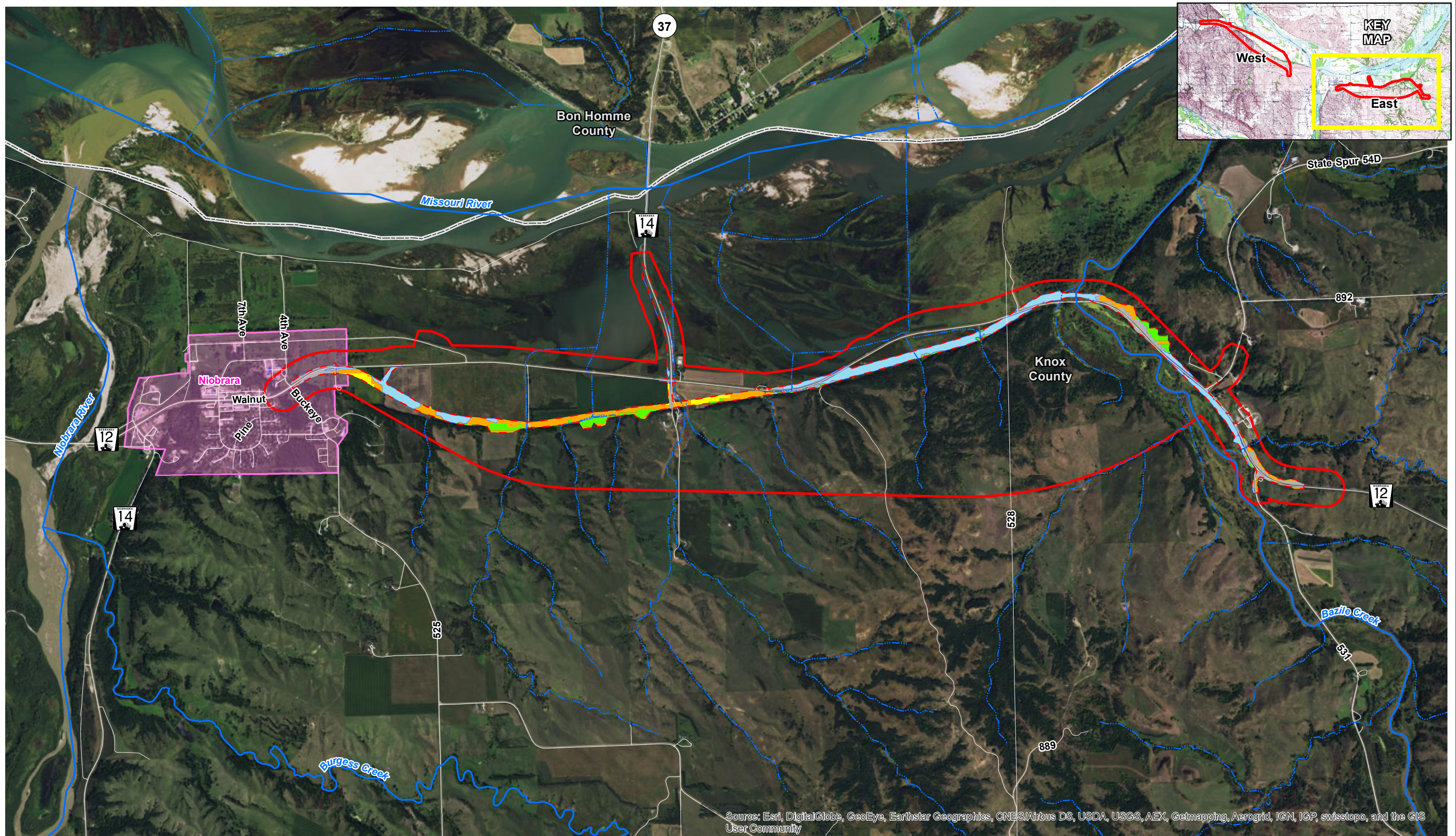


Alternative A3 Natural Environment
West Segment
N-12 Niobrara East and West
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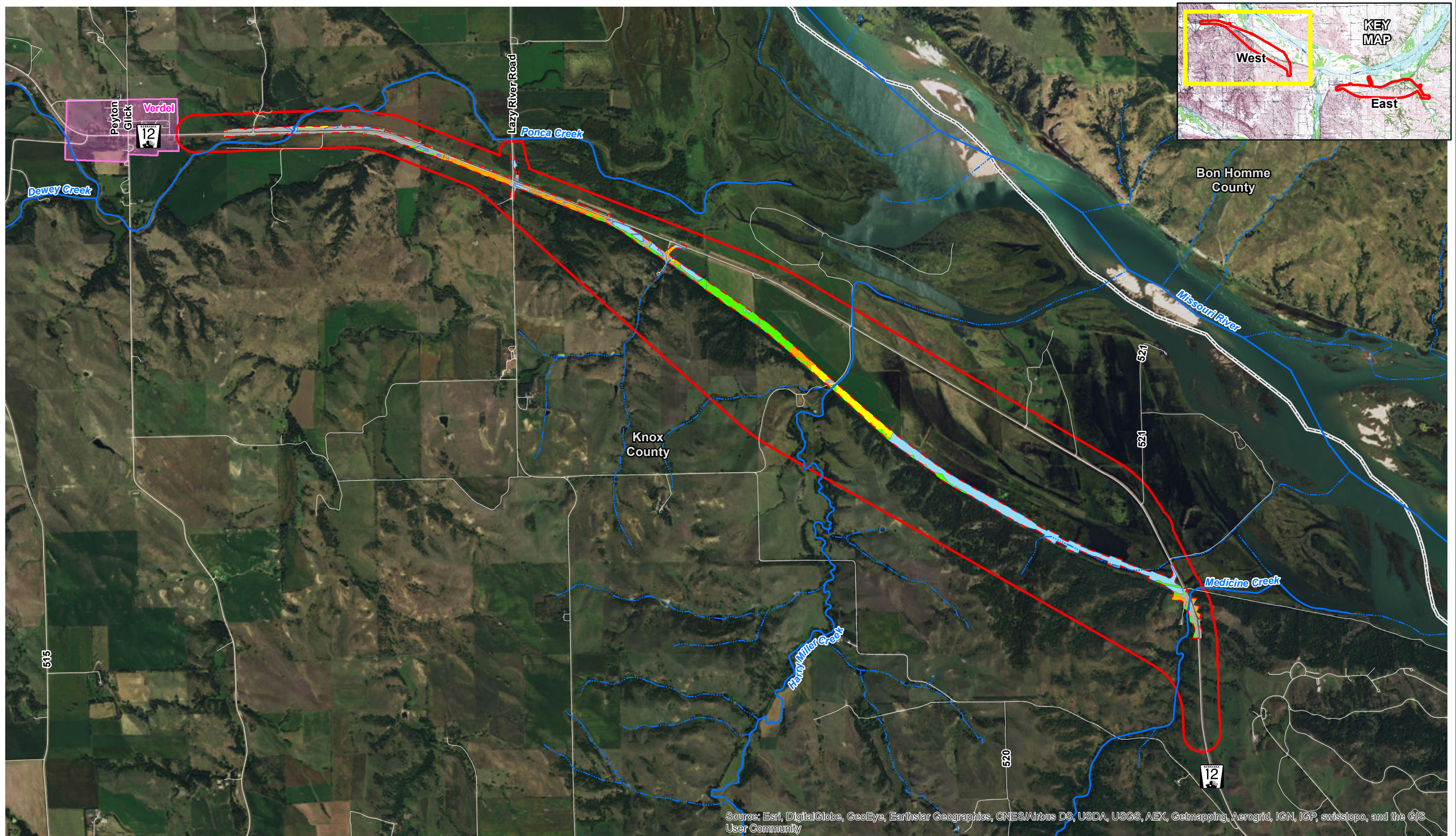


Alternative A3 Natural Environment
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N-12 Niobrara East and West
Knox County, Nebraska
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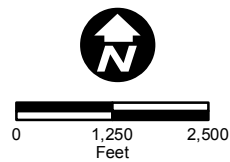


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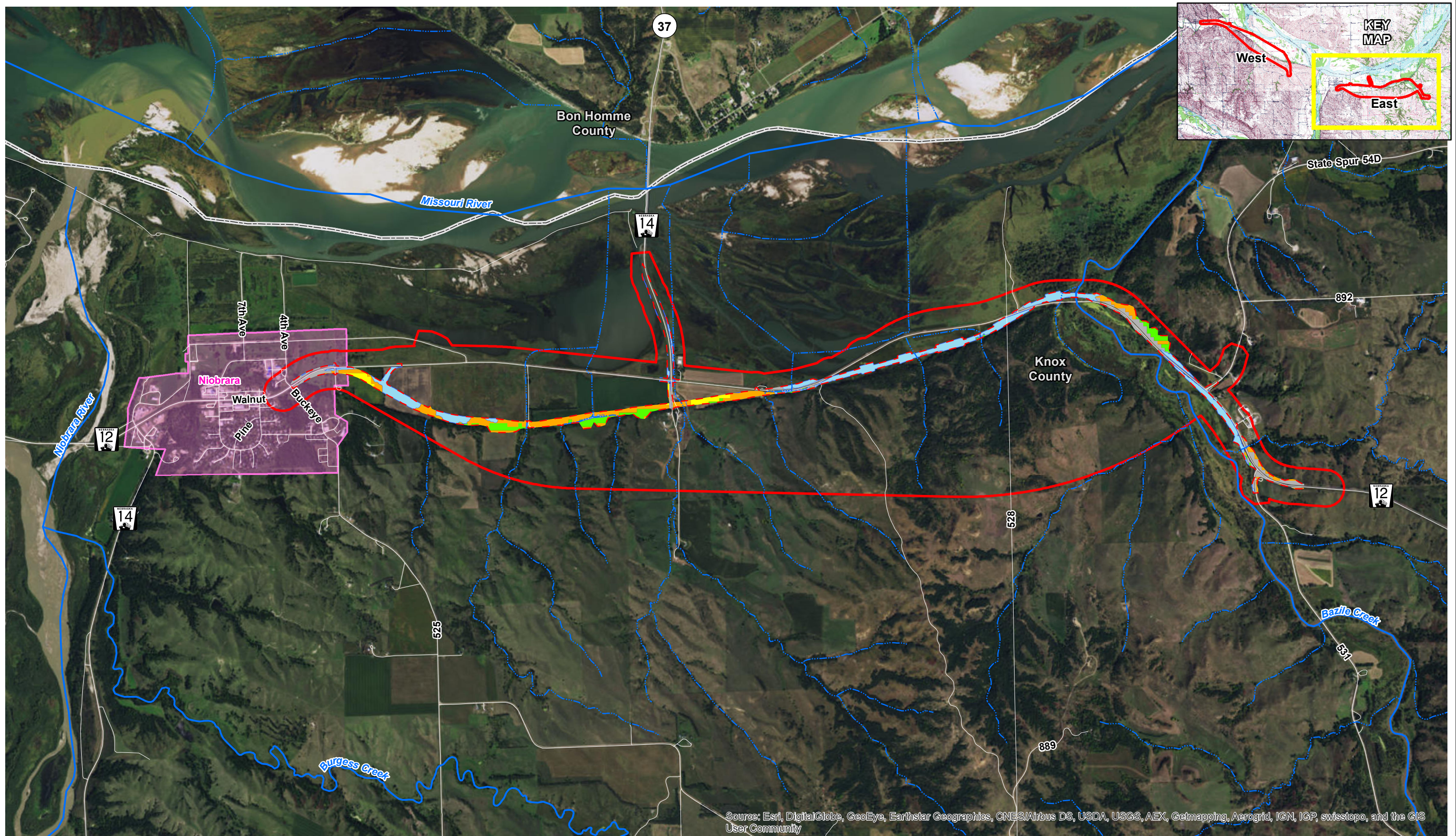


Alternative A7 Natural Environment
West Segment
N-12 Niobrara East and West
Knox County, Nebraska
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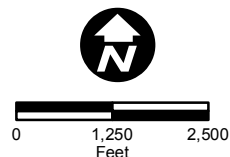


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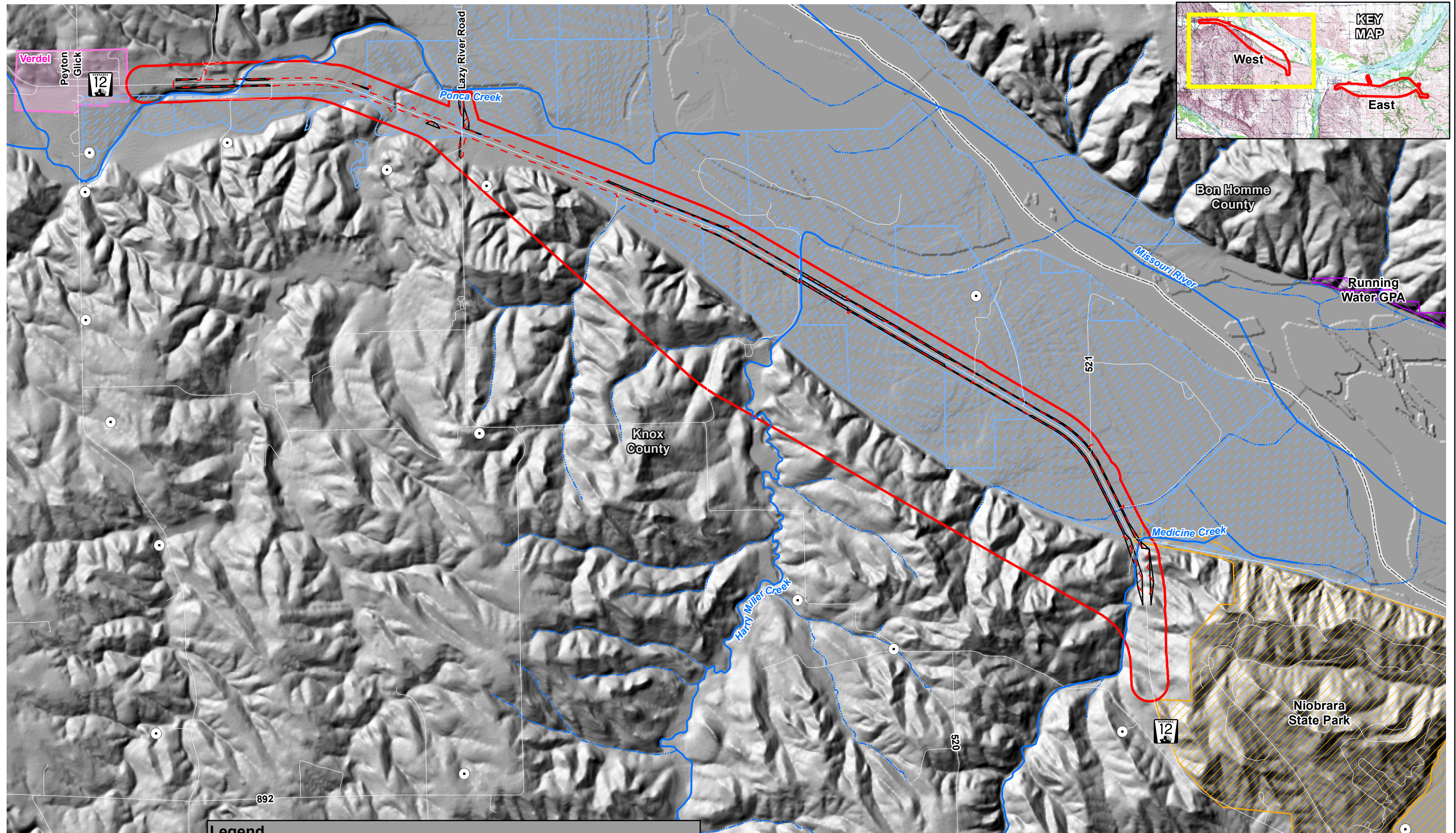


Alternative A7 Natural Environment
East Segment
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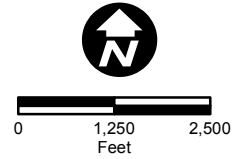


Legend

- Wells
- Permanent Area of Impact
- Waterway
- Roads
- Potential Parcels to be Acquired

- Santee Sioux Nation
- NGPC Property
- SDGFP Property
- USACE Flowage Easement

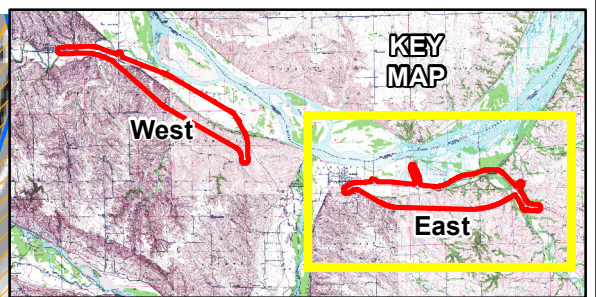
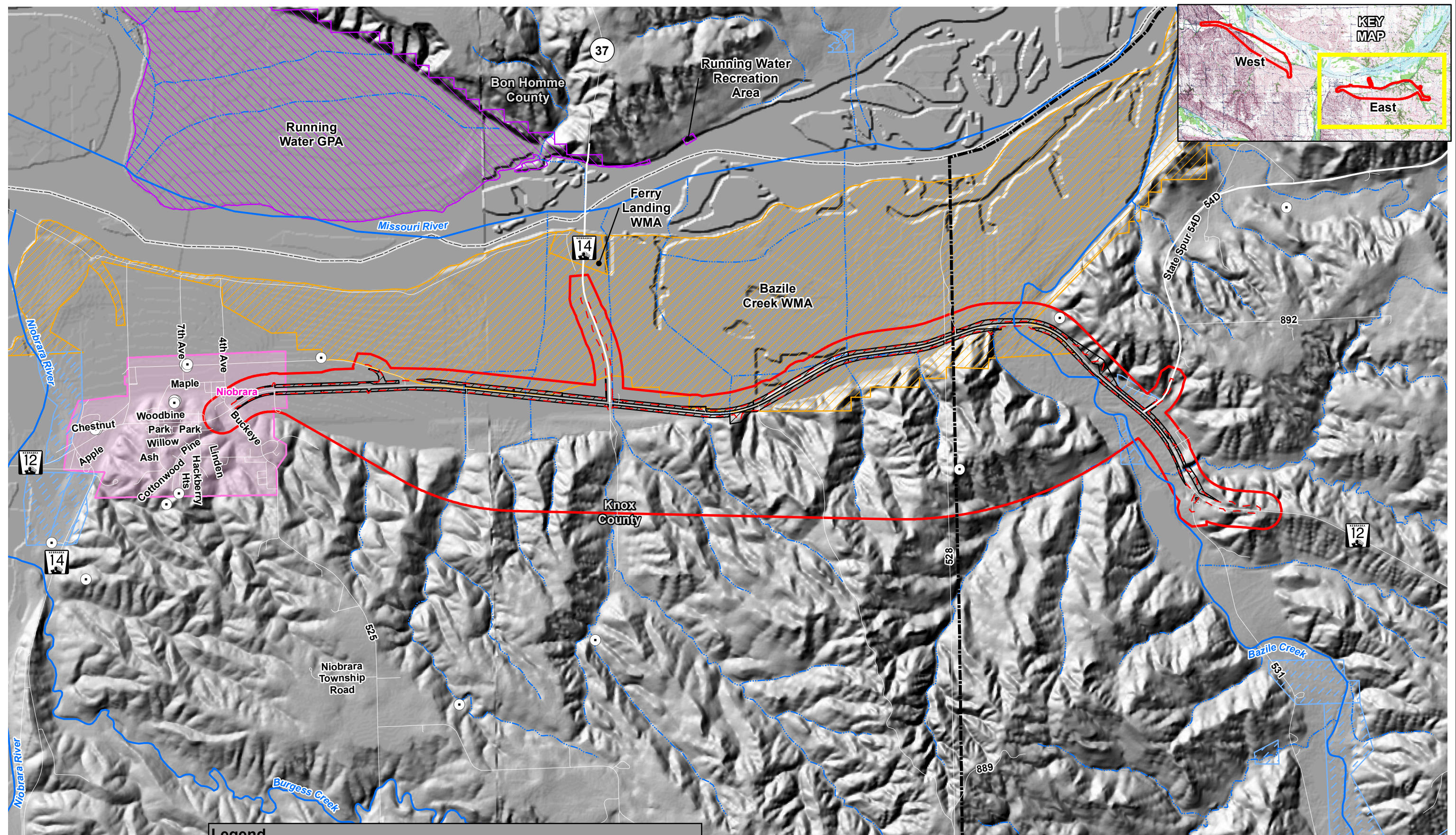
- Study Area
- Counties
- City Limits



Alternative A1 Human Environment
West Segment
N-12 Niobrara East and West
Knox County, Nebraska
Environmental Impact Statement

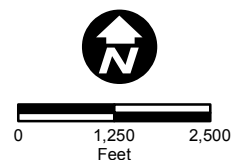
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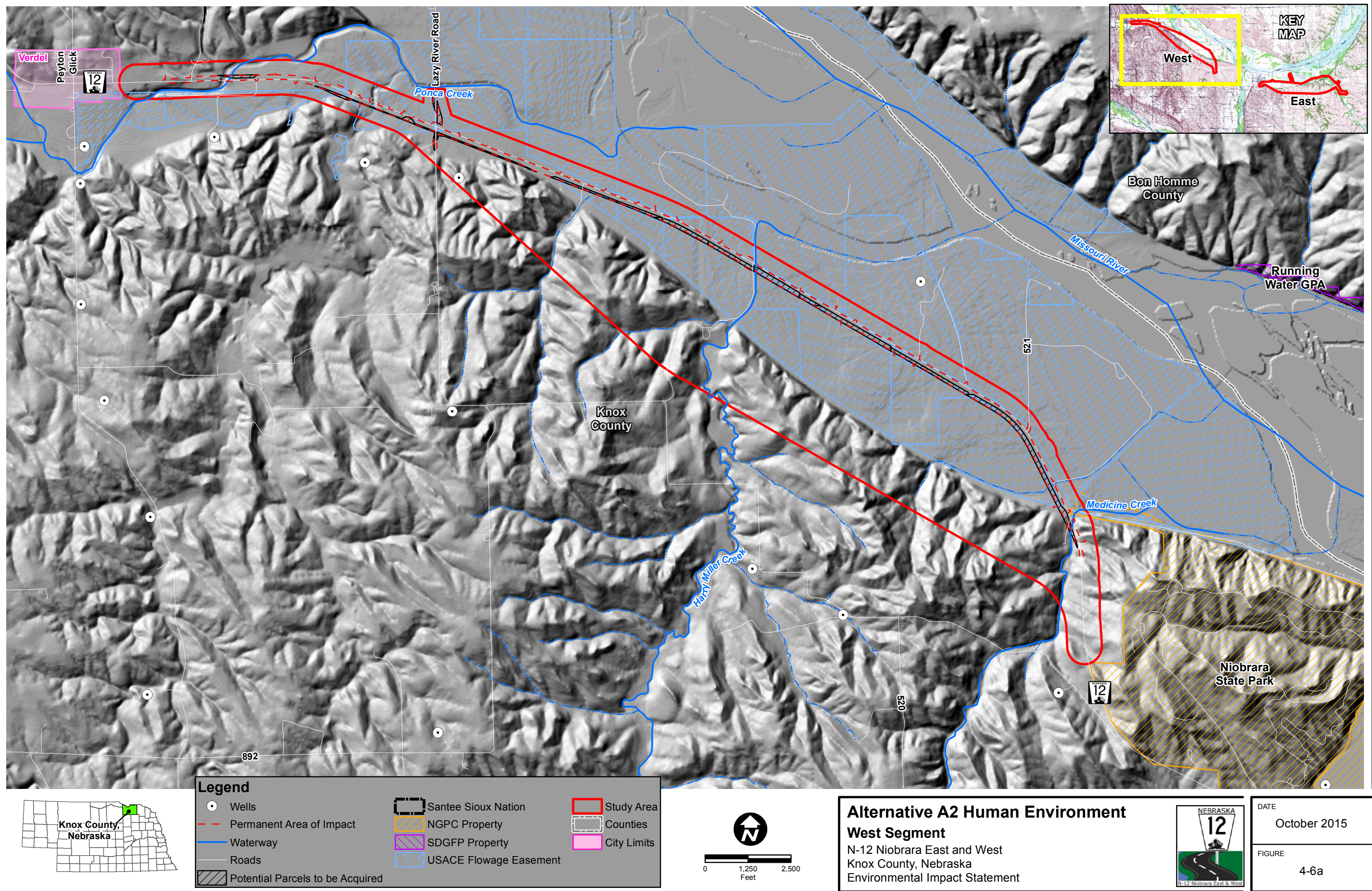
Legend

• Wells	Santee Sioux Nation	Study Area
- - - Permanent Area of Impact	NGPC Property	Counties
Waterway	SDGFP Property	City Limits
Roads	USACE Flowage Easement	
Potential Parcels to be Acquired		

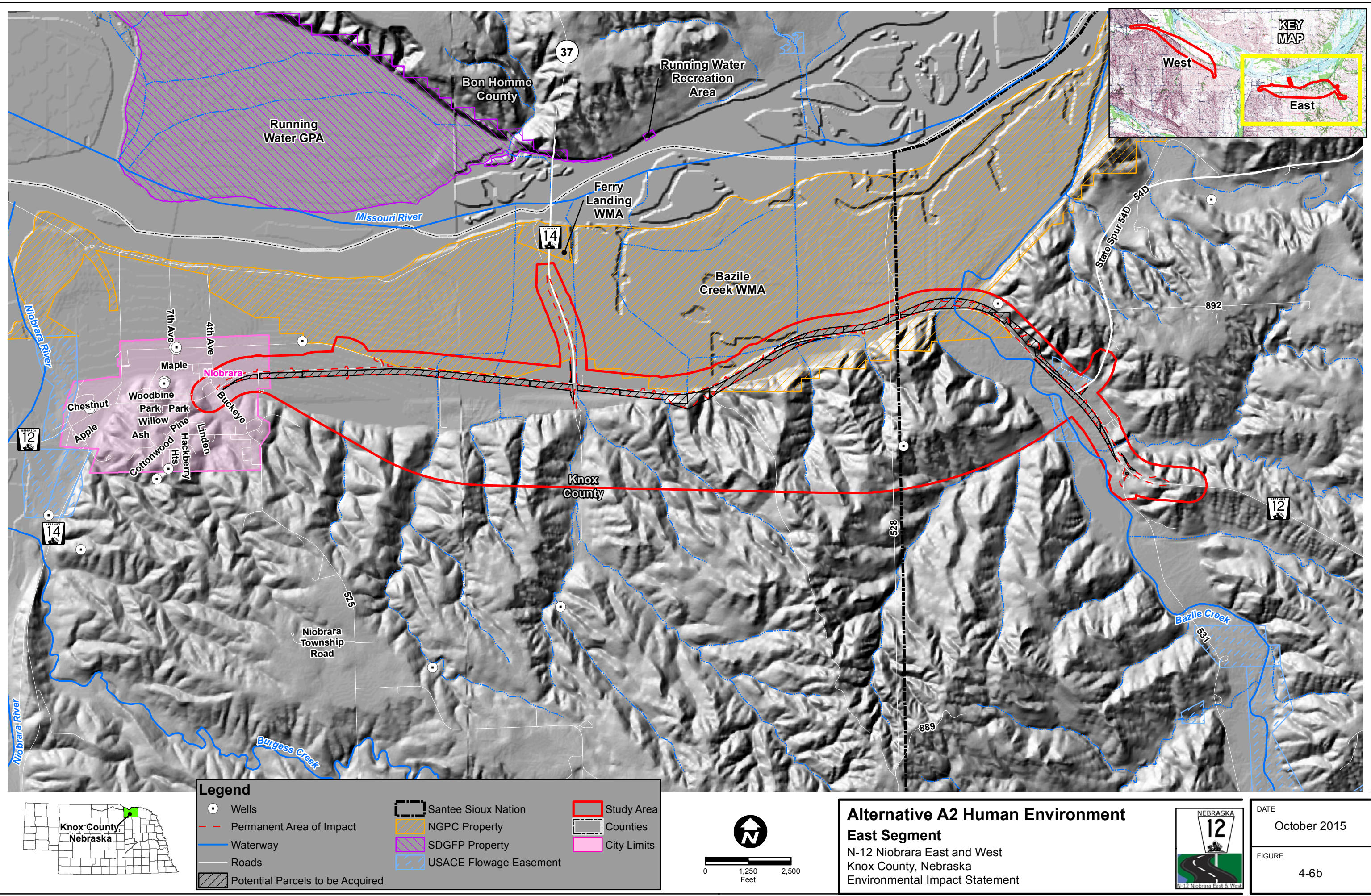


Alternative A1 Human Environment
East Segment
N-12 Niobrara East and West
Knox County, Nebraska
Environmental Impact Statement

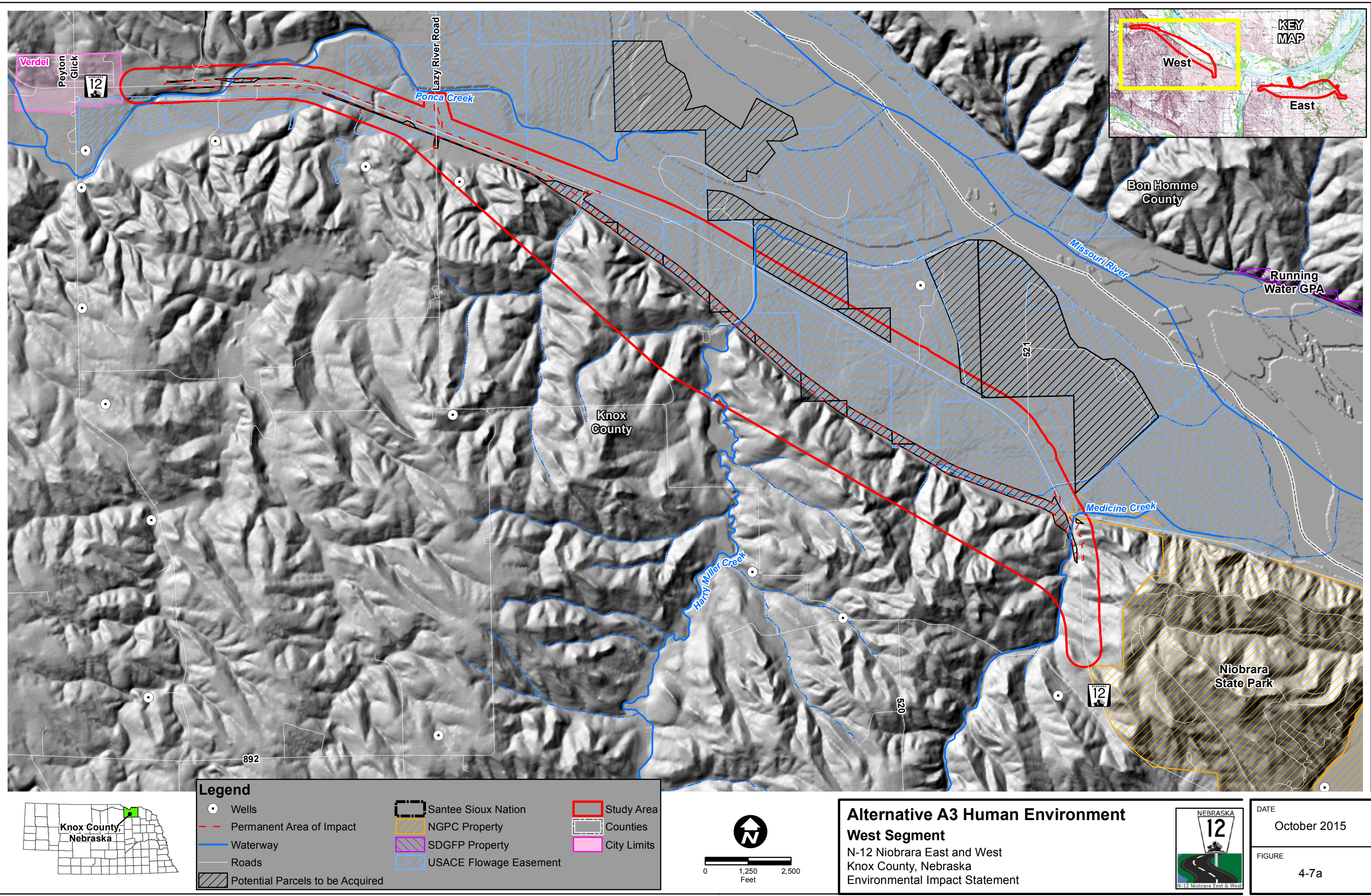
DATE	October 2015
FIGURE	4-5b



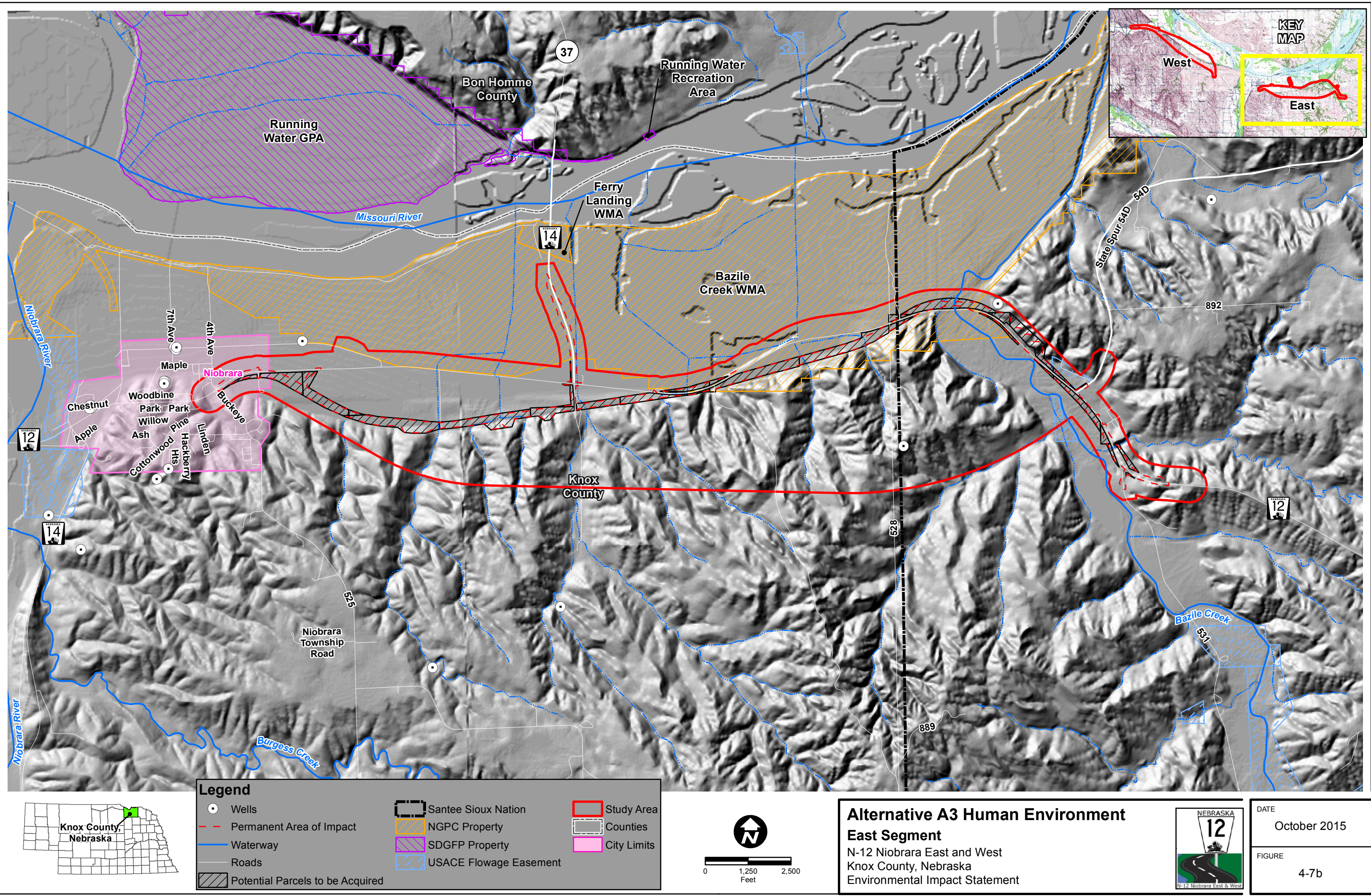
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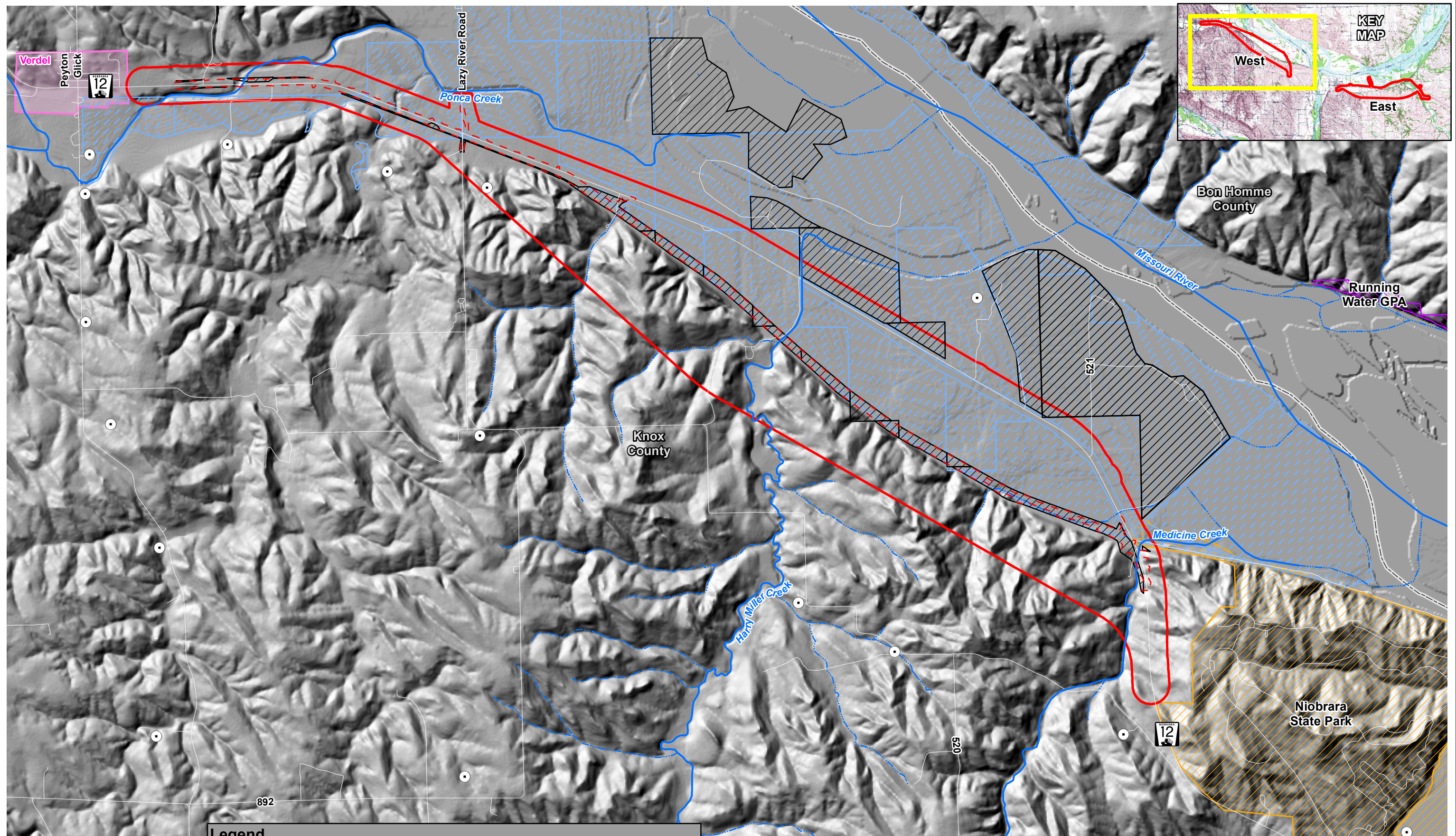
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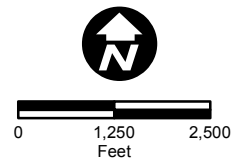


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Legend

- | | | |
|----------------------------------|------------------------|-------------|
| • Wells | Santee Sioux Nation | Study Area |
| - - Permanent Area of Impact | NGPC Property | Counties |
| Waterway | SDGFP Property | City Limits |
| Roads | USACE Flowage Easement | |
| Potential Parcels to be Acquired | | |



Alternative A7 Human Environment
West Segment
N-12 Niobrara East and West
Knox County, Nebraska
Environmental Impact Statement



DATE
October 2015

FIGURE
4-8a

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